Westinghouse

RESTRICTED Ser. No. 3312

INSTRUCTION BOOK FOR
NAVY MODEL GO-9
AIRCRAFT RADIO TRANSMITTING EQUIPMENT

MANUFACTURED FOR U.S. NAVY DEPARTMENT
BUREAU OF SHIPS
CONTRACT NOs-71360(SUPPL.) 31 DEC. 1940
BY WESTINGHOUSE ELECTRIC AND MFG. CO.
RADIO DIVISION BALTIMORE, MD.

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INSTRUCTION BOOK

FOR

NAVY MODEL GO-9

Aircraft Radio Transmitting

Equipment

Manufactured for U.S. Navy Department
Bureau of Ships

Contract NOs-71360 (Supplementary),
dated 31, December, 1940

WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY
Radio Division Baltimore, Md.

CF-337

SPECIAL NOTE

The below listed material has been omitted in the preliminary copies of this instruction book.

Figs. 1-14	-	Photographs
Fig. 26	-	Navy Equipment Model GO-9 Simplified Schematic Diagram
Fig. 27	-	Capacitors - Dimensional Drawings
Fig. 28	-	R.F. Choke Coil - Dimensional Drawings
Fig. 29	-	Resistors - Dimensional Drawings
Fig. 30	-	Transformers and Reactors - Winding Data and Dimensional Drawings
Fig. 31	-	Tuning Coils and Variometers - Winding Data and Dimensional Drawings

SPECIAL NOTE

The below listed material has been omitted in the preliminary copies of this instruction book.

Figs. 1-14 - Photographs

Fig. 28 - Navy Equipment Model 80-9 Simplified Schematic Diagram

Fig. 29 - Capacitors - Dimensional Drawings

Fig. 30 - R.F. Choke Coil - Dimensional Drawings

Fig. 31 - Resistors - Dimensional Drawings

Fig. 32 - Transformers and Reactors - Winding Data and Dimensional Drawings

Fig. 33 - Tuning Coils and Variometers - Winding Data and Dimensional Drawings

INSTRUCTION BOOK
FOR
NAVY MODEL GO-9

RESTRICTED

Aircraft
Radio Transmitting Equipment

FREQUENCY RANGE
300 to 600 Kcs. - 3000 to 18100 Kcs.

TYPES OF TRANSMISSION
CW (A-1) Telegraphy - MCW (A-2) Telegraphy

POWER OUTPUT RATING

WARNING: Do not operate on full power above 15,000 feet altitude

CW Operation
(MCW 70% of CW output)
Below 15,000 ft.

Trailing Wire Antenna	300 - 600 Kcs.	100 Watts
	3,000 - 13,000 Kcs.	125 Watts
	13,000 - 18,100 Kcs.	100 Watts
Fixed Antenna	300 - 600 and 3,000 - 18,100 Kcs.	50 Watts

Above 15,000 ft

Trailing Wire Antenna	300 - 600 Kcs.	70 Watts
	3,000 - 18,100 Kcs.	100 Watts
Fixed Antenna	300 - 450 Kcs.	10 Watts
	450 - 600 Kcs.	20 Watts
	3,000 - 18,100 Kcs.	40 Watts

FOR USE WITH A POWER SUPPLY DELIVERING
A.C.-120 Volts 600/800 Cycles
D.C.-12-14 or 24-28 Volts

RESTRICTED

This instruction book is furnished for the information of the commissioned, warranted, enlisted and civilian personnel of the Navy whose duties involve design, instruction, operation and installation of radio and sound equipment. The word "RESTRICTED" as applied to this instruction book signifies that this instruction book is to be used only by the above personnel, and that the contents of it should not be made known to persons not connected with the Navy.

Manufactured for U. S. Navy Department, Bureau of Ships
Contract NOs-71360, (Supplementary) dated 31 December, 1940

By

WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY
Radio Division Baltimore, Md.

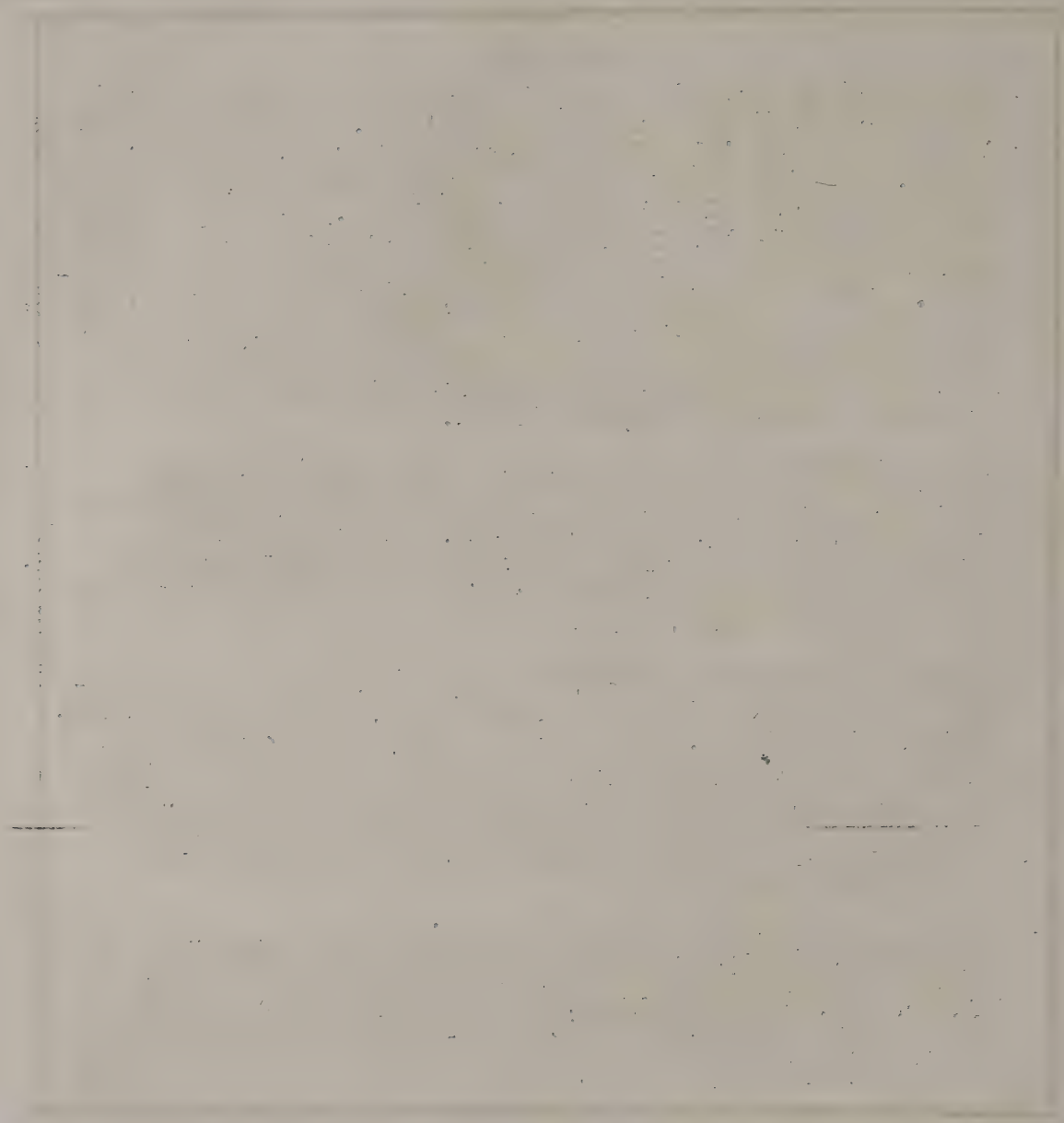
WARNING!

OPERATION OF THIS EQUIPMENT INVOLVES THE USE OF HIGH VOLTAGES WHICH ARE DANGEROUS TO LIFE. OPERATING PERSONNEL MUST AT ALL TIMES OBSERVE ALL SAFETY REGULATIONS. DO NOT CHANGE TUBES OR MAKE ADJUSTMENTS INSIDE EQUIPMENT WITH HIGH VOLTAGE SUPPLY ON. DO NOT DEPEND UPON DOOR SWITCHES OR INTERLOCKS FOR PROTECTION, BUT ALWAYS SHUT DOWN MOTOR GENERATOR OR OTHER POWER EQUIPMENT. UNDER CERTAIN CONDITIONS, DANGEROUS POTENTIALS MAY EXIST IN CIRCUITS WITH THE POWER CONTROLS IN THE OFF POSITION DUE TO CHARGES RETAINED BY CAPACITORS, ETC. TO AVOID CASUALTIES ALWAYS DISCHARGE AND GROUND CIRCUITS PRIOR TO TOUCHING THEM.

GREAT CARE SHOULD BE EXERCISED WHEN OPERATING THIS EQUIPMENT WITH ANY OF THE SHIELDS REMOVED FOR PURPOSE OF OBSERVATION OR BENCH TESTING. THE MAIN POWER SWITCH SHOULD BE TURNED "OFF" AND THE HIGH VOLTAGE CIRCUITS GROUNDED BEFORE ANY INTERNAL PART IS TOUCHED WITH THE BARE HAND.

CAUTION SHOULD BE OBSERVED WHEN OPERATING THIS EQUIPMENT FOR TEST PURPOSES IN THE VICINITY OF OTHER TRANSMITTING EQUIPMENT. DUE TO THE RELATIVELY HIGH POWER OUTPUT OF THIS EQUIPMENT, OPERATION IN THE VICINITY OF OTHER TRANSMITTING EQUIPMENT MAY CAUSE FLASH-OVER OR ARCS IN THE REMOTE EQUIPMENT SHOULD THE ANTENNAS BE RESONANT. TESTING SHOULD BE DONE ON 1/4 POWER UNDER THIS CONDITION.

THE ATTENTION OF OFFICERS AND OPERATING PERSONNEL IS DIRECTED TO BUREAU OF ENGINEERING CIRCULAR LETTER NO. 5a OF 3 OCTOBER 1934, OR SUBSEQUENT REVISIONS THEREOF ON THE SUBJECT OF "RADIO-SAFETY PRECAUTIONS TO BE OBSERVED".



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RESTRICTED

I. PREFACE

CONTRACTUAL GUARANTEE

1-1. The equipment, including all parts and spare parts, except vacuum tubes, storage batteries, rubber and material normally consumed in operation, is guaranteed for a period of TWO YEARS with the understanding that, as a condition of this contract, all items found to be defective as to design, material, workmanship or manufacture will be replaced without delay and at no expense to the Government; provided that such guarantee and agreement will not obligate the contractor to make replacement of defective material unless the failure, exclusive of normal expected shelf life deterioration, occurs within a period of TWO YEARS from the date of delivery of the equipment to and acceptance by the Government and provided further, that if any part or parts (except vacuum tubes) fail or are found defective to the extent of ten per cent (10%) or more of the total number of similar units furnished under the contract (exclusive of spares), such part or parts whether supplied in the equipment or as spares, will be conclusively presumed to be of defective design, and as a condition of contract subject to one hundred per cent (100%) replacement by suitable redesigned units.

Failure due to poor workmanship while not necessarily indicating poor design, will be considered in the same category as failure due to poor design. Redesigned replacements which will assure proper operation of the article will be supplied promptly, transportation paid, to the specified place of delivery upon receipt of proper notice and without cost to the Government.

All such defective articles will be subject to rejection and ultimate return to the contractor. In view of the fact that normal activities of the Naval Service may result in the use of the equipment in such remote portions of the world or under such conditions as to preclude the return of a defective item or unit prior to replacement without jeopardizing the integrity of Naval communications, the exigencies of the Service, therefore, may necessitate expeditious repair of such item or unit in order to prevent extended interruption of communications. In such cases the return of a defective item or unit for examination by the contractor prior to replacement will not be required. The report of a responsible authority, including details of the conditions surrounding the failure will be acceptable for effective adjustment under the provisions of this contractual guarantee.

1-2. The above period of TWO YEARS will not include any portion of the time that the article fails to give satisfactory performance due to defect and the necessity for replacement thereof. All replacements of defective articles will be guaranteed to give TWO YEARS of satisfactory service. The design of this equipment will be such that the vacuum tubes will operate within their published limits and in such a manner that a tube life of 2000 hours may be expected. Vacuum tubes for the 50 watt envelope size and larger will be guaranteed for 500 hours of service life, in accordance with the provisions of specification RE-13A-600B.

1-3. The blank spaces indicated below should be filled in immediately upon completion of the initial service installation. The date of acceptance by the Navy can be determined by the stamped acceptance plate located on the transmitter. These dates are stamped in sequence of day, month and year. This book should accompany the equipment and the service record kept up to date.

1-4. Contract NOs-71360 (Supplementary) dated 31 December, 1940
Serial Number of Equipment _____

Date of Acceptance by Navy (Day) _____(Month)_____
(Year)_____

Date of delivery to contract destination - (Day)_____
(Month)_____(Year)_____

Date of Completion of Installation - (Day)_____
(Month)_____(Year)_____

REPORT OF FAILURE

1-5. Report of failure of any part of this equipment during its life shall be made on Form N. Aer. 4112 "Report of Unsatisfactory or Defective Material" in accordance with the latest instructions issued by the Bureau of Aeronautics. Three copies of this report shall be forwarded to the Aircraft Radio Section, Bureau of Ships and one copy to the Resident Inspector of Naval Material, c/o Westinghouse Electric and Manufacturing Company, Baltimore, Maryland. Copies required for other activities shall be forwarded in accordance with existing instructions. Such reports of failure shall include:

a. Equipment Model_____Serial No. of Equipment_____

b. Navy Type Number of Unit_____

c. Contract No._____Date of Contract_____

d. Date of Acceptance by Navy _____Date placed in service _____ _____.

e. Covered by contract guarantee, yes or no _____

f. Replacement needed, yes or no _____

g. Part which failed _____

h. Nature and cause of failure _____

i. Remedy used or proposed _____

It is most necessary that all Fact Spaces be filled in (and accurately) at origin of Failure Report.

INSTRUCTION BOOK

1-6. In the compilation of this instruction book, every effort has been made to provide the answer to every reasonable question which may arise in connection with the installation, efficient operation, and servicing of the Model GO-9 Aircraft Radio Transmitting Equipment. It has further been attempted to group the large amount of contained material in such a manner that any desired information pertaining to this equipment is most readily found. For greatest convenience in use, the sheets bound in the Appendix have been folded in a manner openly displaying their titles along the right margins. To preserve the full usefulness of this book, it is suggested that these marginal edges be reinforced by backing of paper or gummed tape, should they begin to show wear from handling.

1-7. To the uninitiated, the electrical circuits of the Model GO-9 Aircraft Radio Transmitting Equipment may appear quite complicated. Actually, the various individual operating and control circuits are for the most part rather simple, and it is only the wide choice of combinations provided for, which complicates the combined circuit. Considerable pains have therefore been taken in Part III to describe each component circuit in some detail. On the folded sheets of the Appendix will be found not only the complete circuit diagrams and actual wiring connections of all units, but also schematic representations of the various circuits. Where it may assist further in clarifying their function, portions of the circuit are also reproduced in simplified, elementary schematic form. Since the schematic diagrams for the sake of clarity frequently omit minor connections, the actual wiring diagram should be consulted when tracing connections and in locating trouble.

1-8. Part IX, PARTS LIST, supplies sufficient detailed information regarding the various components, suitably classified, to be valuable not only for parts replacement purposes, but also for servicing and repair work. For example, typical resistance values or winding data are supplied for all reactors, transformers and coils. Further, since the function and use of each component part is stated, frequent reference to this

section is invited in connection with the study of the various circuit diagrams.

1-9. Attention is invited to the "Table of Typical Test Currents and Voltages", (Fig. 32) which shows representative normal meter readings and should prove of value in connection with locating troubles, as described in Part VIII.

1-10. Before commencing an installation of the Model GO-9 Aircraft Radio Transmitting Equipment in an airplane, read carefully not only Part IV of this instruction book, but also the preceding parts which lead up to it. Attention is invited to Part II enumerating additional parts required for an installation, not regularly furnished as part of the equipment. Additional information on installation will be obtained by referring to the Bureau of Aeronautics' latest installation instructions for Model GO-9 Aircraft Radio Transmitting Equipment in airplanes of various types.

ABBREVIATIONS

1-11. Throughout this book only such abbreviations as are in common usage have been employed and these sparingly. A number of these are listed below:

A.C.----------alternating current
adj.----------adjustable, adjustment
a.f.----------audio frequency
amp.----------amperes
ant.----------antenna
bat.----------battery
C.F.I.--------Crystal Frequency Indicator
C.W.----------continuous wave (telegraphy)
D.C.----------direct current or double contact
DCC-----------double cotton covered (wire)
DSC-----------double silk covered (wire)
DPST----------double pole, single throw (switch)
fil.----------filament
flex----------flexible
gen.----------generator
gnd-----------ground (i.e., airplane structure or chassis of equipment)
H -----------henry (unit of inductance)
H.F.----------high frequency
H.T.----------high tension
H.V.----------high voltage
I.C.S.--------interior communication system (interphone)
kcs.----------kilocycles
L ----------symbol for coil inductance
I.F.----------Intermediate Frequency
L.V.----------low voltage
ma.----------milliamperes

mcs.	-----	megacycles (thousands of kilocycles)
M.C.W.	-----	modulated continuous wave, i.e., tone modulated telegraphy
mfd.	-----	microfarads
mmfd.	-----	micro-microfarads (i.e., millionths of a microfarad)
M.H.	-----	milli-henry (thousandths of a henry)
mic.	-----	microphone
M.O.	-----	master oscillator
mod.	-----	modulator, modulation
osc.	-----	oscillator, oscillation
P.A	-----	power amplifier
R.	-----	resistor, resistance
rec.	-----	receiver, receiving
s.c.	-----	single contact
ser.	-----	Ser. No., or series
SPDT.	-----	single pole, double throw (switch)
t.	-----	turns
tel.	-----	telephone, telephony
Term.	-----	terminal
trans.	-----	transmit, transmitter
v.	-----	volts
Voice	-----	speech modulated transmission, i.e., radio telephony
w.	-----	watts

DEFINITIONS

1-12. The following definitions apply to certain terms as used in this instruction book:

1-13. "Ground" - the terms ground and ground connection throughcut this instruction book are used to denote the electrical potential of the airplane structure or fuselage, and any connection thereto; since the cable shielding and the protective cases of all major units of the Model GO-9 Aircraft Radio Transmitting Equipment are electrically bonded to each other and connected to the fuselage, connection to the chassis or mechanical structure of the various units represents a ground connection.

1-14. "Interphone" - Interior (telephone) communication system, between occupants of the airplane.

1-15. "Pilot" - In a two seater installation, the aviator controlling the Extension Control Box is generally the pilot of the airplane.

1-16. "Observer" - See under "Operator" below.

1-17. "Operator" - In a two seater installation the terms operator and observer have been used interchangeably to denote the occupant who has control of the transmitter control box and usually has access to the transmitter and receiver units.

1-18. "Type of Emission" - Type of radio transmission, i.e., "C.W.", "MCW".

1-19. "Direct Ray" - Radio wave which travels in a direct line from the antenna transmitting the signal to that receiving it, without reflection or appreciable refraction.

1-20. "Reflected Ray" or "Sky Wave" - Radio wave which travels between the transmitting and receiving station by way of "reflection" from the Kennelly-Heaviside layer ("ionosphere").

1-21. "Tank Circuit" - An inductance and a capacitance, in parallel, usually connected in the grid or plate circuit of an oscillating vacuum tube; sometimes called a "flywheel" circuit.

1-22. "Side Tone" - The signal heard in his own helmet, by the pilot or radio operator, while he is transmitting by telegraph.

1-23. "Pentode" - A five element vacuum tube; contains a filament or cathode, grid, screen grid, suppressor grid and plate.

1-24. "Tetrode" - a four element vacuum tube; contains a filament or cathode, grid, screen grid and plate.

1-25. "Triode" - A three element vacuum tube; contains a filament or cathode, grid and plate.

II. INTRODUCTION AND GENERAL DESCRIPTION

INTENT OF THE DESIGN

2-1. The Model GO-9 Aircraft Radio Transmitting Equipment is intended and is suitable for installation in Navy land or seaplanes of the patrol type.

2-2. Reliable communication with other units of the Naval Service can be effected in the 300 to 600 or the 3000 to 18,100 kilocycle frequency bands when used in conjunction with the receiving equipment listed in paragraph 2-4.

2-3. The equipment supplied on Contract NOs-71360 (Supplementary) consists of the following units:

Type CAY-52192 Intermediate Frequency Transmitter.
Type CAY-52193 High Frequency Transmitter.
Type CAY-20103 Rectifier Unit.
One complete set of vacuum tubes.
Two Receiver Monitoring Cables.
Two instruction books.
One water-proof slip cover.
One set of spare parts (Listed in Part XI).

2-4. The following accessories are not a part of the equipment as supplied on Contract NOs-71360 (Supplementary) but are a necessary part of a complete operative installation in a patrol plane. Refer to the instruction books supplied with the various units for the description and operation of each:

(1) 600-800 Cycle power supply (NEA-2), (NEA-1), (NEB-1A) or equivalent.

(2) Receiving equipment, Model RU or equivalent.

(3) Model LM Series Frequency Measuring Equipment.

(4) Helmet with headphones.

(5) Flame-proof telegraph key with cable and plug.

(6) Antenna Reel, with 500 ft. Model J antenna wire and weight.

(7) Antenna fairlead with antenna length counter.

(8) Fixed antenna installation.

ACTUAL DESIGN

2-5. The Transmitter-Rectifier Assembly consists of three frames fastened together to operate as a single mechanical unit and includes the necessary electrical circuits, tubes and control apparatus for taking power from the 120 volt, 600/800 cycle power supply and delivering telegraphically keyed CW and MCW radio frequency energy to an antenna.

2-6. Each unit consists of an aluminum frame which encloses the various component electrical parts. The three individual units, namely: High Frequency Transmitter, Rectifier Unit, and Intermediate Frequency Transmitter, are fastened together by means of snap catches and guide pins. All of the necessary connections between units are made by contact brushes and contacts. The side and rear shields are of aluminum and are attached to the frame by means of slide catches or screws. Shock-mounting of the Transmitter-Rectifier Assembly is accomplished by means of a mounting rail, fastened to the under side of each unit, which clamps to "Lord" type shock-mounts installed in the plane. The top of the assembly is prevented from movement by means of angle shaped mountings which also fasten to "Lord" type shock-mounts. The shock-mounts are so designed that the assembly or any unit may be conveniently removed from its mounting when the mountings are installed in a plane.

2-7. For normal operation, the three units are fastened together; however, if desired, only two units may be used, either the High Frequency Transmitter Unit and Rectifier Unit, or the Intermediate Frequency Transmitter Unit and Rectifier Unit. For this type of operation, the side shield of the transmitter unit not being used is removed and fastened to the Rectifier Unit to cover the side that would be left open by the removal of a transmitter unit. A suitable interlock connection bridges the interlock circuits that are normally open by the removal of a transmitter unit and allows operation.

2-8. Access to the tubes in the transmitter units is obtained by removing the side shield. The Rectifier Unit is provided with a small cover plate located in the front panel of the unit through which the tubes may be reached. The cover plate or shields are securely held in place by slide catches that engage a set of pins or guides. The following tubes are used in the Model GO-9 Aircraft Radio Transmitting Equipment:

Intermediate Frequency Transmitter Unit

1 Type 801 Master Oscillator
1 Type 807 Intermediate Amplifier
1 Type 803 Power Amplifier

High Frequency Transmitter Unit

1 Type 837 Master Oscillator
1 Type 837 Intermediate Amplifier or Frequency Doubler
1 Type 803 Power Amplifier

Rectifier Unit

1 Type 5Z3 Low Voltage Rectifier
2 Type 1616 High Voltage Rectifiers

2-9. A receptacle for the power cable plug is provided at the rear of the Rectifier Unit.

2-10. The key jacks and side tone jacks are located on the front panel of the Rectifier Unit.

2-11. Antenna connections for the various types of antennas are located on the top of the Rectifier Unit and Intermediate Frequency Transmitter Unit, the correct employment being given upon the nameplate at the top of each of these units.

LIST OF COMPONENTS WITH WEIGHTS AND DIMENSIONS

2-12. The equipment supplied under this contract consists of the following component units or parts;

Intermediate Frequency Transmitter - Type CAY-52192
Size: Height - 33-31/32 inches
Width - 10-1/2 inches
Depth - 16-3/8 inches
Weight - 44 lbs.

High Frequency Transmitter - Type CAY-52193
Size: Height - 33-31/32 inches
Width - 10-1/2 inches
Depth - 16-3/8 inches
Weight - 47.5 lbs.

Rectifier Unit - Type CAY-20103
Size: Height - 33-31/32 inches
Width - 7-3/8 inches
Depth - 16-3/8 inches
Weight - 40.5 lbs.

Complete Set of Vacuum Tubes, consisting of:

1 - Type 801
1 - Type 807
2 - Type 837
2 - Type 803
2 - Type 1616
1 - Type 5Z3
Total Weight - 2.5 lbs.

2 Receiver Monitor Cables (Length 10 Ft.) Weight 1.25 lbs.
Water-Proof Slip Cover - Weight 1.9 lbs.

Spare Parts

Operating Spare Parts in Box

Height - 15-1/2 inches
Width - 24 "
Depth - 12 "
Weight - 24 lbs.

Secondary Spare Parts (shipped in bulk)

TOTAL WEIGHT OF EQUIPMENT SUPPLIED UNDER CONTRACT LESS SPARE PARTS AND INSTRUCTION BOOKS 137.65 lbs.

2-13. The spare parts supplied as part of this equipment are listed in Part XI. Operating Spare Parts are shipped in a metal box having the dimensions given above while the Secondary Spare Parts are shipped in bulk.

III. DETAILED DESCRIPTION

Outline and Mounting Dimension Drawing Fig. 21
Schematic Diagram Fig. 22
Wiring Diagram, Type CAY-52192 Transmitter Unit Fig. 23
Wiring Diagram, Type CAY-52193 Transmitter Unit Fig. 24
Wiring Diagram, Type CAY-20103 Rectifier Unit Fig. 25
Photographs - Figure 1 to 14 inclusive

MECHANICAL

High Frequency Transmitter Type CAY-52193

3-1. The High Frequency Transmitter Type CAY-52193 is assembled in an aluminum frame, the bottom, front panel and top of which has been formed from a single sheet of material. Angle supports have been spot welded to the rear to complete the frame. Reinforcement gussets have been spot welded into the corners for added rigidity. This method of construction maintains the necessary strength and rigidity required by equipment for aircraft service and at the same time provides a unit of light weight. The frame is divided into three sections by means of aluminum floors. The lower section houses the master oscillator, the center section contains the intermediate amplifier, while the top section houses the power amplifier and antenna tuning system. The side and rear shields are of aluminum and can be removed without disturbing internal parts. Located on the inside of the small side shield at the bottom of the transmitter is a nameplate giving typical dial setting for various frequencies. The rear shields are fastened to the frame by means of bind-head screws, while the side shields are fastened by means of slide catches.

3-2. The Transmitter Unit is supported on shock-mounts which are in turn supported by a slide rail arrangement. This facilitates removing the transmitter from its mounting when the mounting is installed in a plane.

3-3. The Transmitter Unit is fastened to the Rectifier Unit by means of snap catches and guide pins. Contact buttons located on the Transmitter Unit are arranged to make contact with contact brushes located on the Rectifier Unit for the application of operating voltages as supplied by the Rectifier Unit.

3-4. With reference to Figure 1, the location of the various controls on the front panel can readily be found. Located at the bottom on the left hand side is the doubler circuit tuning control (DOUBLER TUNING, Control "D"). In the lower center is the plate covering the master oscillator calibration reset access hole (M.O. CALIBRATION CORRECTION). To the right and slightly lower down on the panel is located

the H.F. crystal frequency indicator connection post (C.F.I.) for use only in adjusting the oscillator to frequency. On the bottom right hand side is located the master oscillator tuning control knob (M.O. TUNING, Control "B"). The controls next in line above are, on the left the doubler circuit range switch (DOUBLER RANGE, Control "C") and to the right, the master oscillator range switch (M.O. RANGE, CONTROL "A"). Above the controls just mentioned and to the left is located the intermediate amplifier grid current meter (I.A. GRID CURRENT), above which is located the power amplifier grid current meter (P.A. GRID CURRENT). To the right of these two instruments is located the intermediate amplifier tuning control (INT. AMP. TUNING, Control "F") and above this is located the intermediate amplifier range switch (I.A. RANGE, Control "E"). The next controls above are the antenna coupling control (ANT. COUPLING, Control "K"), to the right of which is located the power amplifier tuning control (P.A. TUNING, Control "G"). Above these controls and in the center of the panel is located the antenna ammeter (R.F. OUTPUT). At the top left is located the antenna tuning inductance control (ANT. INDUCTANCE, Control "J"). The antenna tuning capacitor control (ANT. TUNING CAPACITOR, Control "I") is located at the top right of the panel. In the center of the panel between, and slightly below controls "I" and "J" is located the antenna voltage-current feed switch (ANTENNA FEED, Control "H").

3-5. Access to the master oscillator and intermediate amplifier tubes is by removal of the side shields.

Rectifier Unit, Type CAY-20103

3-6. The Rectifier Unit Type CAY-20103 is assembled in a spot-welded aluminum frame similar to that used for the High Frequency Transmitter. The Rectifier Unit supplies the operating voltages for the High Frequency and Intermediate Frequency Transmitters. The unit is divided into two sections by an aluminum floor. The bottom section contains the filament transformer, auxiliary rectifier plate transformer, filter choke and filter capacitors for the two rectifiers housed in this unit. The top section contains the main plate transformer and all rectifier tubes, and the necessary switches to allow transfer of the operating circuits. The antenna terminal for the High Frequency Transmitter and the terminals for the High Frequency and Intermediate Frequency Receivers are located on the top of the Rectifier Unit.

3-7. The Rectifier Unit is supported on a shock mount equipped with a slide rail in a manner similar to the High Frequency Transmitter.

3-8. Referring to Figure 1, the following controls are located on the front panel of the Rectifier Unit:

At the extreme bottom of the unit are located four jacks, namely; the key jack, (KEY) the receiver relay grounding jack (REC. RELAY), the I.F. side tone jack (I.F. SIDE TONE), and the H.F. side tone jack (H.F. SIDE TONE). Directly above the jacks are located the A.C. voltage compensation switches (A.C. VOLTAGE COMPENSATION). Above the A.C. voltage compensation switches from left to right are located the MCW-CW selector switch (EMISSION), the side tone volume control (SIDE TONE) and the filament rheostat (FILAMENT). In the center of the panel immediately above the controls just mentioned is located the power control switch (POWER CONTROL). In the center left of the panel is located the on-off switch (POWER) and to the center right of the panel is located the H.F.-I.F. transmitter transfer switch (TRANSMITTER SELECTOR). These latter controls are located just below the tube access door. At the top of the panel to the left is located the power amplifier plate current meter (P.A. PLATE CURRENT) and to the right adjacent to it is located the filament voltmeter (FILAMENT VOLTS). On the top of the Rectifier Unit the following terminals are located: Intermediate Frequency Receiver antenna terminal (I.F. RECEIVER), ground (GROUND), High Frequency Receiver antenna terminal (H.F. RECEIVER), and the High Frequency Transmitter antenna terminal (H.F. TRANSMITTER OUTPUT).

Intermediate Frequency Transmitter Type CAY-52192

3-9. The frame of the Intermediate Frequency Transmitter Type CAY-52192 is of the same construction as the other two frames of the equipment. Back and side shields, similar to those on the High Frequency Transmitter, are provided and fastened to the frame in the same manner. The unit is divided into two sections by means of an aluminum floor. In the bottom section is located the master oscillator and the intermediate amplifier circuits. The top section houses the power amplifier and the antenna tuning system components. On the top shield of the unit is located the antenna terminals for the trailing wire and fixed antennas, the correct employment being given upon the nameplate at the top of each of these units.

3-10. The shock-mount system is the same as used for the High Frequency Transmitter.

3-11. Referring to Figure 1, the following controls are located on the front panel of the Intermediate Frequency Transmitter: Located at the bottom from left to right are the I.F. crystal frequency indicator coupling post (C.F.I.), the calibration reset access plate (M.O. CALIBRATION CORRECTION), and the master oscillator tuning control (M.O. TUNING, Control "B"). Above this, and slightly to the left is located the master oscillator range switch (M.O. RANGE, Control "A"). Above these items immediately below the center line of the panel is located the power amplifier grid current meter (P.A. GRID CURRENT). Above the power amplifier grid current meter are located the antenna coupling control (ANT. COUPLING, Control "H") to the left and the power amplifier tuning control (P.A. TUNING, Control "D") at the right. Above these two controls, located on the vertical center line of the panel is the power amplifier range switch (P.A. RANGE, Control "C"). To the left and above the power amplifier range switch is located the antenna tuning control (ANT. TUNING, Control "G"), and to the right of which is located the antenna ammeter (R.F. OUTPUT). At the top of the panel and above Control "G" is located the antenna stop switch (ANTENNA TUNING STEP, Control "F") and to the right of this control is located the antenna range switch (ANT. LOAD, Control "E").

3-12. Access to the master oscillator and intermediate amplifier tubes is by removal of the side shield.

Monitor Cables

3-13. Two monitor cables are provided to allow connection of the receivers to the side tone circuit jacks located on the Rectifier Unit. The cables each consist of ten feet of two-conductor rubber covered cable fitted at each end with a standard phone plug.

Water-proof Slip Cover

3-14. A water-proof slip cover for the complete Transmitter-Rectifier assembly is provided.

ELECTRICAL CIRCUITS

3-15. The electrical circuits of the Model GO-9 Aircraft Radio Transmitting Equipment may be best understood by referring to the Schematic Diagram Fig. 22.

High Frequency Transmitter, Type CAY-52193

3-16. The High Frequency Transmitter Type CAY-52193 has a nominal rating of 125 watts output over the frequency range 3000 to 13,000 Kcs. and 100 watts output over the frequency range of 13,000 to 18,100 Kcs., when operating into a trailing wire antenna at altitudes below 15,000 feet. Above this altitude the nominal rating is 100 watts over the frequency of range 3,000 to 18,100 Kcs. It is designed to operate

into the types of fixed and trailing wire antennas used on Navy patrol planes. The electrical circuits of the transmitter are as described in the following paragraphs. Circuit symbol numbers for the components of this unit are 301 to 399 inclusive.

3-17. The master oscillator consists of a Type 837 tube connected in an electron coupled oscillator circuit. This circuit covers the frequency range of 1500 to 3050 kilocycyles and is tuned by means of the variable Tuning Inductance L-301. Capacitors C-304 and C-305 form the capacity bridge used in a Colpitts' type circuit while Capacitors C-302 and C-303 are shunting capacitors used to obtain the correct frequency. Capacitor C-301 is the master oscillator calibration reset capacitor and is used to correct the calibration of the master oscillator dials when vacuum tubes are changed. Range Switch S-301-A and S-301-B connect the correct amount of inductance and capacity in the circuit for the various ranges. The filament power to the vacuum tubes is supplied from the Filament Transformer T-202 located in the Rectifier Unit and is supplied through R.F. Chokes L-302 and L-303. These chokes are used to prevent the radio frequency energy of the circuit from leaking back through the filament transformer. Capacitors C-333 and C-334 are filament bypass capacitors and the center tap of the filaments is correctly obtained by means of Resistors R-303 and R-313. Capacitor C-309 is the screen grid bypass capacitor. The screen grid voltage is supplied by the low voltage rectifier in the Rectifier Unit through Series Dropping Resistor R-304. The plate voltage for the vacuum tubes is supplied by the low voltage rectifier through R.F. Choke L-304. A frequency doubling or tripling circuit consisting of Coil L-305, Capacitor C-312 and Padding Capacitor C-316 is connected in the output of the master oscillator and is coupled to the plate of the master oscillator by means of Coupling Capacitor C-311. The frequency range of this circuit is selected by means of the Doubler Circuit Range Switch S-302 which varies the inductance in the circuit. This circuit is tuned by Capacitor C-312 to the second harmonic of the oscillator frequency for operation between 3000 and 6100 kilocycles and to the third harmonic of the oscillator frequency for operation between 6100 and 9150 kilocycles. Under no condition is the fundamental frequency of the oscillator used in the output of the transmitter. This circuit supplies the excitation to the intermediate amplifier through the Grid Coupling Capacitor C-314.

3-18. The intermediate amplifier utilizes a Type 837 vacuum tube connected in a plate tank circuit consisting of Coil L-307 and Variable Capacitor C-320. Capacitors C-317 and C-318 are the bypass capacitors on the screen grid and suppressor grid respectively. Screen grid and suppressor grid power is supplied by means of the low voltage rectifier in the Rectifier Unit and is supplied from taps on the potentiometer composed of Resistors R-305 and R-306. The plate tank circuit

operates as a straight through amplifier over the frequency range of 3000 to 9150 kilocycles and as a frequency doubler over the range of 9150 to 18,100 kilocycles. This circuit supplies the excitation to the power amplifier and is coupled to the grid of the power amplifier through coupling Capacitor C-335. Grid bias for the intermediate amplifier tube is fed to the grid of the tube through R.F. Choke L-306 and is supplied by means of the Fixed Resistor R-307. The grid current is indicated by means of Grid Meter M-301.

3-19. The power amplifier utilizes a Type 803 power amplifier tube connected in a plate tank circuit consisting of Variable Inductance L-309 and Variable Capacitor C-328. The variable capacitor and variable inductance are mechanically linked together to form a tank circuit having an extremely wide frequency range without use of tap switches. Grid bias to the power amplifier tube is supplied through the R.F. Choke L-308 and is obtained by means of Grid Resistor R-310. The grid current is indicated by Grid Current Meter M-302. The filament circuit is bypassed by means of Capacitors C-323 and C-324. The screen grid and suppressor grid of the power amplifier tube are bypassed by means of Capacitors C-325 and C-326 respectively and are fed by the low voltage circuit through Resistors R-311 and R-314. The power amplifier tank circuit operates as a straight through amplifier throughout the frequency range of 3000 to 18,100 kilocycles, and does not require the use of tap switches. Capacitors C-336 and C-327 are the power amplifier tank circuit bypass capacitors.

3-20. The antenna circuit consists of the Variable Tuning Capacitor C-330, the Antenna Feed Switch S-304, the Variable Tuning Inductance L-310, and the Variable Antenna Coupling Capacitor C-329. The antenna current is indicated by means of the Antenna Ammeter M-303.

3-21. A protective interlock circuit is provided in the High Frequency Transmitter Unit consisting of the Switches S-305 and S-306. These switches are connected in the coil circuit of the keying relay associated with this unit in such a manner as to prevent operation of the keying relay if either section of the side shield is removed.

Intermediate Frequency Transmitter, Type CAY-52192

3-22. The Intermediate Frequency Transmitter Unit, Type CAY-52192, has a nominal rating of 100 watts over the frequency range of 300 to 600 kilocycles when operating into a trailing wire antenna at altitudes below 15,000 feet. Above this altitude the nominal rating is 70 watts over the frequency range 300 to 600 kilocycles. When operating into a fixed antenna below altitude of 15,000 feet, the nominal rating is 50 watts over the frequency range 300 to 600 kilocycles. When operating above this altitude, the nominal rating is 10 watts over the frequency range 300 to 450 kilocycles and 20 watts over the frequency range of 450 to 600 kilocycles. It is designed to operate in conjunction with the types of fixed and trailing

wire antennas in use on Navy patrol planes.

3-23. With reference to schematic diagram, Figure 22, the following circuits and tubes are used. Circuit symbol numbers for the components of this unit are 101 to 199 inclusive.

The master oscillator consists of a Type_801 tube in a Colpitts' oscillator circuit. The master oscillator tank circuit consists of Inductance L-101 and Capacitors C-102 and C-103. Capacitor C-101 is the master oscillator calibration reset capacitor used for adjusting the calibration of the master oscillator dial when the master oscillator tube is changed or when the circuit calibration changes due to aging. Capacitor C-106 is the compensation capacitor used for variable ambient compensation. The frequency range of the oscillator is divided into five ranges by means of Range Switch S-101. In conjunction with the precision dial this allows accurate calibration and reset. Capacitor C-105 is a grid blocking capacitor. The grid of the tube is supplied with bias through R.F. Choke L-103 and is supplied by means of grid Bias Resistor R-101. Capacitors C-109 and C-110 are the filament bypass capacitors.

3-24. The intermediate amplifier consists of a Type_807 tube connected in a non-tunable bandpass circuit. This circuit is coupled to the master oscillator circuit through Coupling Capacitor C-111. Grid bias is supplied to the tube through the R.F. Choke L-104 and is obtained by means of Resistor R-102. Resistor R-103 is a filament voltage dropping resistor used to apply the correct filament voltage to the tubes. Resistor R-104 is a cathode bias resistor used to supply additional bias to the tube and is by-passed by means of Capacitor C-113. Resistor R-105 is a screen grid series resistor used to drop the voltage to the correct value. Screen grid voltage is obtained by means of a tap on the Potentiometer R-106 and R-107 and is supplied by the low voltage rectifier in the Rectifier Unit. Plate voltage for the tubes is supplied through the R.F. Choke L-105 through the series dropping Resistor R-108. The plate voltage is also supplied by the low voltage Rectifier Unit. The bandpass circuit consists of the Blocking Capacitor C-115, Inductance L-106, Capacitor C-119 and the plate filament capacity of the Type_807 intermediate amplifier tube. This circuit is so adjusted as to pass the frequency range of 300 to 600 kilocycles without the necessity for any tuning controls. Frequency doubling is not used in the Intermediate Frequency Transmitter. The master oscillator frequency is fed straight through to the power amplifier by the intermediate amplifier bandpass circuit. Grid bias for the power amplifier tube is supplied through the R.F. Choke L-107 and is supplied by means of Bias Resistor R-109. The grid current is indicated by means of Meter M-101.

3-25. The power amplifier circuit utilizes a Type_803 vacuum tube connected in a tank circuit consisting of the Variable Inductance L-108, Tank Circuit Capacitors C-124 and C-125. A Power Amplifier Range Switch S-102-A and S-102-B varies the amount of inductance and capacity in the circuit to obtain the desired range. Capacitor C-126 is the power amplifier plate bypass capacitor. The power amplifier tube is supplied with screen and suppressor voltages from the low voltage rectifier in the Rectifier Unit. The screen voltage is supplied through Series Resistor R-110. Capacitors C-122 and C-123 are the bypass capacitors for the screen grid and suppressor grid respectively.

3-26. The antenna circuit is inductively coupled to the power amplifier circuit and consists of the Antenna Loading Inductance L-110, Antenna Tuning Inductance L-109 and Fixed Antenna Loading Inductance L-111. Switch S-104 is the antenna step switch, while Switch S-103 is the antenna range switch. These switches allow the proper amount of inductance to be cut in the circuit to allow operation on any antenna having a capacity ranging between 280 and 1900 mmfds. For operation into a fixed antenna having a capacity of 150 mmfds., the Load Coil L-111 is cut into the circuit.

3-27. An interlock circuit is provided in the Intermediate Frequency Transmitter Unit which consists of the Interlock Switch S-105. This switch is connected in the coil circuit of the keying relay associated with this unit in such a manner as to prevent operation of the keying relay when the side shield is removed.

Rectifier Unit, Type CAY-20103

3-28. The Rectifier Unit, Type CAY-20103 contains the necessary transformers, tubes, resistors, etc., to take power from the 120 volt, 600-800 cycle alternator and to deliver operating voltages to either the High Frequency or the Intermediate Frequency Transmitter. Operating voltages cannot be applied simultaneously to both transmitters. Circuit symbol numbers for the components of this unit are 201 to 299 inclusive.

3-29. The main rectifier circuit employs two Type_1616 high vacuum rectifier tubes connected in a full wave circuit. This rectifier consists of Transformer T-201, the two Type_1616 tubes and Filter Capacitor C-202. The output of this rectifier is 2000 volts at 175 milliamperes and is used for the plate supply for the Type_803 tubes.

3-30. An auxiliary rectifier or low voltage rectifier circuit supplies plate voltage for the master oscillator and intermediate amplifier tubes. This rectifier circuit consists of a Type 5Z3 high vacuum rectifier tube in a full wave circuit, Transformer T-203, Filter Capacitors C-204 and C-205, Bleeder Resistor R-209 and the Filter Choke L-201. The output of this rectifier is 500 volts at 200 milliamperes.

3-31. A side tone or monitoring winding is provided on Transformer T-203 and the output voltage is available on Jacks J-202 and J-203. Variable Resistor R-204 is used to control the amount of voltage supplied, while Resistor R-203 is a protective resistor to prevent the transformer winding from overheating in case of short circuit.

Since the High Frequency Transmitter is keyed by Keying Relay K-201 and the Intermediate Frequency Transmitter is keyed by Keying Relay K-202, separate side tone circuits are required as a check on the action of the relays.

3-32. The A.C. power input from the altenator is connected to terminals marked B and E, while the D. C. input is connected to terminals D and C. Terminal C is positive, while terminal D is negative or ground. The positive side of the D.C. supply is brought out from the rectifier side of Fuse F-203 to terminal A. In addition, the compensated side of the A.C. supply, after passing through Fuse F-202 and Capacitor C-201, is brought out to terminal F. These two terminals, A and F, provide supply for starting a dynaltenator if desired. The above six terminals, A,B,C,D,E, F are contained in a six-connector receptacle which is located in the rear center of the Rectifier Unit. From terminals B and E, the A.C. circuit connects directly to the Main Power Control Switch S-201. Capacitors C-209 and C-210 are radio frequency bypass capacitors to prevent any radio frequency energy from getting back into the generator circuit. From the main power switch the circuit is through Main Fuses F-201 and F-202. The Connection from Fuse F-201 is common to the primary of Transformer T-201, T-202, and T-203 through Filament Resistor R-201. The connection from Fuse F-202 passes through the A.C. Voltage Compensation Capacitor C-201 and associated Switches S-204, S-205, S-206, and S-207. Resistor R-202 is connected across Capacitor C-201 so as to discharge Capacitor C-201 when the primary voltage is removed. The closing of the Main Power Switch S-201 applies power directly to the Transformer T-202. This transformer serves to supply energy for heating the filaments of all tubes. Power is applied to the primaries of Transformers T-201 and T-203 through the contacts #4 and #11 of Keying Relays K-201 and K-202. Switch S-203 is the power control switch in the primary circuit of the Main Rectifier Plate Transformer T-201. D.C. voltage is connected to the transmitter

as previously explained. Capacitor C-211 is connected from the positive side of the line to ground and acts as an R.F. filter to prevent any radio frequency voltages from entering the D.C. circuit. The D.C. circuit is closed by means of Switch S-202 which is mechanically connected to the Main Power Switch S-201. Fuse F-203 provides protection for the D.C. circuit. The D.C. circuit from Fuse F-203 is through the interlocked circuit of the High Frequency Transmitter, through the coil circuit of Keying Relay K-201 then through the coil circuit of Keying Relay K-202, through the interlocked circuit of the Intermediate Frequency Transmitter, and through the circuit of Jack J-201 to ground or the negative side. Interlock Switches S-210, S-211, and S-212 are in the Rectifier Unit and serve to close the interlock circuits which would be left open if the High Frequency Transmitter or the Intermediate Frequency Transmitter were not in use. A receiver Relay Grounding Jack J-204 is connected in parallel with the Key Jack J-201 and is used to ground the receiver relay. Resistor R-208 and Capacitor C-207 form an arc absorption circuit to prevent sparking at the key contacts.

3-33. As previously explained, the master oscillators, intermediate amplifiers and power amplifier tubes in both the High Frequency and Intermediate Frequency Transmitters are supplied by the rectifiers located in the Rectifier Unit. These voltages are applied to either the High Frequency or Intermediate Frequency Transmitters by means of the Transmitter Selector Switch S-208. Filament voltage applied to the power amplifier tube is indicated by means of Filament Voltmeter M-202. When the filament voltmeter is adjusted to 10 volts by means of Filament Rheostat R-201, the voltage as applied to all tubes is correct.

3-34. Keying of the transmitters is accomplished by means of Keying Relays K-201 and K-202 which are located in the Rectifier Unit. Keying Relay K-201 is used for the High Frequency Transmitter while Keying Relay K-202 is used for the Intermediate Frequency Transmitter. The action of the keying relays is as follows: Contacts, #5, #6, #9 and #10 serve to transfer the antenna to the receiver or to the transmitter. In the de-energized position contacts #9 and #5 are closed and the antenna is connected directly to the receiver antenna terminals on the Rectifier Unit. In the energized position contacts #6 and #10 are closed while contacts #5 and #9 are open, thus transferring the antenna to the transmitter for transmission. In addition, contacts #8 and #2 close and ground the receiver antenna terminal. Contacts #7 and #3 close and complete the circuit to the side tone jack. The grounding of contact #1 closes the grid return circuit of the master oscillator. The closing of contacts #4 and #11 applies power to the primary of the high voltage and low voltage transformers. For detailed operation on the adjustment of the keying relay, refer to Figure 15.

3-35. The equipment is arranged for 12 or 24 volts D.C. operation by means of links provided in the top of the Rectifier Unit. For 12 volt D.C. operation the coils of Keying Relays K-201 and K-202 are connected in parallel while for 24 volt operation the coils are connected in series.

IV. INSTALLATION

EQUIPMENT

4-1. The components comprising the Model GO-9 Aircraft Radio Transmitting Equipment are listed in paragraph 2-3, while additional necessary accessories are mentioned in paragraph 2-4.

PRELIMINARY CONSIDERATION

4-2. Before commencing installation, the equipment should be checked very carefully to see that all of the required parts are at hand. Since the Model GO-9 Aircraft Radio Transmitting Equipment does not include a receiver, the installation of the transmitter only is considered in this section. If facilities are available for making bench tests of the various components prior to installation, this procedure is desirable. The completeness of such bench tests will depend almost entirely upon the equipment available. In some cases, it should not only be possible to determine that the equipment is in good condition, but also the frequency may be adjusted and all of the tap settings be determined. If such tests are considered feasible, the section of this book dealing with operation should be consulted.

4-3. Although it is general practice to see that all metal parts of the fuselage of the plane are electrically connected in order to minimize radio interference in the receiver, this important feature is sometimes overlooked in connection with a transmitter installation. Actually, it is even more important that all metal parts be bonded in a transmitter installation since otherwise sparking may occur during transmission. In the case of control wires or other parts which cannot be conveniently bonded, it is desirable that adequate insulation be provided. Owing to the relatively high frequency involved, it is necessary that the metal parts be bonded together at frequent intervals or else insulated for relatively high potentials. The details of such electrical bonding are beyond the scope of this book but its importance is well worth considering.

INSTALLATION

4-4. The exact location of the unit within the structure will vary somewhat with each type of airplane. In general, any convenient arrangement will operate satisfactorily provided the antenna leads are not too long and are adequately supported and insulated. The telegraph key should be within convenient reach, preferably at the right side and ahead of

an arm rest which sometimes may conveniently be a folding shelf. In certain installations, two telegraph keys connected in parallel may be installed for the observer for alternate use when facing forward or aft. Since the controls on the Transmitter-Rectifier Assembly require occasional attention, and because it may be necessary to renew the fuses which are contained in it during the flight, the assembly should be mounted in an accessible position.

4-5. When a suitable location for the Transmitter-Rectifier Assembly has been chosen, a ground connection to the metal framework of the plane should be run independent of all bonding connections. This ground connection should be fastened to the ground post on the bottom of each of the units. In order to minimize resistance losses, this connection should preferably be of relatively large cross section and should be connected to one of the larger frame members of the plane.

4-6. The shock mounting is contained as a part of each of the units. Separable slides are located on the bottom of each unit to facilitate installation and removal of the unit. The bottom sections of the shock-mount are to be bolted to the framework in the plane so as to give adequate clearance on all sides of the transmitter. In general, this clearance should be at least 1-1/2" in all directions.

4-7. The cables must be arranged so that they will not exert any strain which might neutralize the effect of the shock-mount.

4-8. Owing to the voltages and frequencies involved, the antenna connections must either be provided with heavy insulation or else mounted on stand-off insulators to prevent breakdown. Model J or J-1 phosphor bronze cable (antenna wire) protected by large ceramic beads (NAF-212989-3) is recommended for all transmitter antenna connections in conjunction with the improved type disconnect terminals, (NAF Type SK-937). Rubber insulated cable is not recommended, because of its higher dielectric losses and possible fire hazard.

4-9. Before placing the Transmitter-Rectifier Assembly in position on the shock-mounts, a set of vacuum tubes should be installed. To install these tubes, the left side shield of the Intermediate Frequency Transmitter, the tube access door in the center of the Rectifier Unit panel and the right side shield of the High Frequency Transmitter should be removed. The following tubes may then be installed in the

Intermediate Frequency Transmitter: a Type_801 tube in the bottom or master oscillator section, a Type_807 in the socket above the master oscillator section, a Type_803 tube in the power amplifier tube socket located in the upper section of the unit. In the Rectifier Unit, a Type_5Z3 tube is to be inserted in the auxiliary or low voltage rectifier tube socket (the socket nearest the front panel). A Type_1616 tube is to be placed in each of the rear sockets. In the High Frequency Transmitter, a Type_837 tube is to be placed in the master oscillator section and a second Type_837 tube is placed in the intermediate amplifier in the center section. A Type_803 tube is to be inserted in the power amplifier tube socket located in the top section of the frame. The plate clips should be fastened to all tubes and all tubes should be securely clamped with the latching clamps provided.

4-10. In inserting the tubes as described above, care should be taken that the Type_5Z3 tube is not interchanged with either the Type_801 or the Type_1616 tubes. Inasmuch as the sockets for all of the last four tubes mentioned are of the standard four-pin type, it is important that the tubes be located exactly as described. In addition, the leads to the Type_1616 tube should be kept well clear of ground to avoid any high voltage flash-over. When the tubes have been inserted as described, the shields should be replaced on these units and the equipment then placed in the correct position on the shock-mount.

V. CHOICE OF FREQUENCY AND METHOD OF COMMUNICATION

SKIP AND FADING DISTANCES

5-1. The high frequencies differ from conventional intermediate frequencies in that a much greater communication range can be obtained for a given power. This is in some measure due to considerably greater radiation efficiency at high frequencies of both trailing and fixed antennas as used on aircraft. For the main part, however, the advantage of the high frequencies is due to their more effective reflection (or refraction) by the Kennelly-Heaviside layer giving rise to a sky wave which may be effective at a considerable distance as compared with a direct wave which is soon lost as a result of high ground absorption. At the high frequencies, the sky wave is weak or entirely absent at a short distance from the transmitting station, but becomes effective at a considerable distance from it. At the same time, increasing ground absorption reduces the effective distance of the direct wave. As the frequency is raised, therefore, the skip zone commences earlier and persists over a greater distance. In the day time, there is danger of a skip zone when frequencies above 6000 kilocycles are used, while at night, frequencies as low as 4000 kilocycles may exhibit skip distance. At frequencies not sufficiently high to give actual skip zones, there may nevertheless be a zone of violent fading. This is generally noticeable at distances from 50 to 150 miles, as the result of interference between the direct wave and sky wave. If the direct wave is strengthened in comparison with the sky wave, the zone of critical communication due to fading or skip may be narrowed down or completely bridged over. One or more of the following methods may be practicable to obtain improvement in communication at moderate range:

(a) Flying at the greatest practicable altitude will extend the direct wave. Distance communication, which is entirely by sky wave, is generally not affected by the altitude of the airplane, when this exceeds about 100 feet.

(b) For most effective communication at distances between 50 and 150 miles, frequencies above 5000 kilocycles should be avoided.

(c) The trailing wire antenna, at moderate distances, gives much better communication than is obtainable with the fixed antenna. If the frequency used is above 4000 kilocycles, lengthening the trailing wire to operate on its harmonic frequency, as a three-quarter wave

antenna, will generally give further improvement. For suggested antenna lengths, see paragraph 6-23.

DISTANCE OF DIRECT WAVE

5-2. The following table shows, for various distances, the approximate altitudes required for communication by direct wave both between one airplane and ground, and between two airplanes flying at the same altitudes. The altitudes indicated are slightly above the heights at which a straight line joining the two stations becomes tangent to the earth's surface.

APPROXIMATE ALTITUDES FOR DIRECT WAVE COMMUNICATION OVER VARIOUS DISTANCES

Distance Miles	Plane-to-Ground Altitude of 1 Plane - Ft.	Plane to Plane Altitude of Both Planes - Ft.
40	1000	300
60	2500	800
80	4500	1000
100	6500	1500
120	9500	2500
150	15000	4000
200	-	6500
250	-	10000
300	-	15000

COMPARISON OF COMMUNICATION BY C.W. AND M.C.W.

CW Telegraphy:

5-3. This method provides the greatest distance range, and gives the least interference, both in the immediate vicinity of the transmitter and at a distance. Because of its sharper tuning, it is more difficult when slightly off frequency to establish initial communication by CW than by MCW.

MCW Telegraphy:

5-4. This method is most valuable as an auxiliary to CW transmission during conditions of fading. Also, during initial calls and at other times when the transmitting operator is uncertain whether the receiver standing by for him is in oscillating (heterodyne) condition, transmission by MCW would appear the preferable method. After establishing communication by MCW, if communication is poor, a shift to CW generally results in improvement. When the emitted carrier lacks frequency stability due to excessive vibration or other causes, the MCW method may be preferable to CW.

DISTANCE-FREQUENCY CHART

5-6. The following table is based upon general experience with high frequencies and aircraft communication. Communication conditions on these frequencies may show appreciable variation from day to day. For any given distance, the best order of frequency not only varies with the time of day, but it is also somewhat lower in the winter time than during the summer. Average frequency ranges for best results over various communication distances are estimated below:

Distance	Estimated Best Frequency Kcs.		
Miles	Mid-day	Dawn or Dusk	Night
0 - 50	3000-4525	3000-4525	3000-4525
50 -150	3000-4000	3000-4000	3000-4000
150 -250	4000-6000	3500-4525	3000-4000
250 -400	6000-8000	4000-6000	3500-4525
400 -600	6000-9050	4500-7000	4000-6000
600 -1000	8000-9050	6000-8000	4500-7000

VI. OPERATION

CONTROLS

6-1. Before proceeding with the preliminary adjustment of the equipment, the operator should thoroughly familiarize himself with the functions and locations of the various controls. These are completely described in Part III. of this book.

WARNING!

6-2. OPERATION OF THIS EQUIPMENT INVOLVES THE USE OF HIGH VOLTAGES WHICH ARE DANGEROUS TO LIFE. OPERATING PERSONNEL MUST AT ALL TIMES OBSERVE ALL SAFETY REGULATIONS. DO NOT CHANGE TUBES OR MAKE ADJUSTMENTS INSIDE EQUIPMENT WITH HIGH VOLTAGE SUPPLY ON. DO NOT DEPEND UPON DOOR SWITCHES OR INTERLOCKS FOR PROTECTION BUT ALWAYS SHUT DOWN MOTOR GENERATOR OR OTHER POWER EQUIPMENT. UNDER CERTAIN CONDITIONS DANGEROUS POTENTIALS MAY EXIST IN CIRCUITS WITH POWER CONTROLS IN THE OFF POSITION DUE TO CHARGES RETAINED BY CAPACITORS, ETC. TO AVOID CASUALTIES ALWAYS DISCHARGE AND GROUND CIRCUITS PRIOR TO TOUCHING THEM.

GREAT CARE SHOULD BE EXERCISED WHEN OPERATING THE EQUIPMENT WITH ANY OF THE SHIELDS REMOVED FOR PURPOSE OF OBSERVATION OR BENCH TESTING. THE MAIN POWER SWITCH SHOULD BE TURNED "OFF" AND THE HIGH VOLTAGE CIRCUITS GROUNDED BEFORE ANY INTERNAL PART IS TOUCHED WITH THE BARE HAND.

CAUTION SHOULD BE OBSERVED WHEN OPERATING THIS EQUIPMENT FOR TEST PURPOSES IN THE VICINITY OF OTHER TRANSMITTING EQUIPMENT. DUE TO THE RELATIVELY HIGH POWER OUTPUT OF THIS EQUIPMENT, OPERATION IN THE VICINITY OF OTHER TRANSMITTING EQUIPMENT MAY CAUSE FLASH-OVER OR ARCS IN THE REMOTE EQUIPMENT SHOULD THE ANTENNAS BE RESONANT. TESTING SHOULD BE DONE ON 1/4 POWER UNDER THIS CONDITION.

PRELIMINARY ADJUSTMENT - GENERAL

6-3. Before applying any power or attempting any preliminary adjustment of the equipment, the POWER switch on the Rectifier Unit should be checked to see that it is in the OFF position. The A.C. VOLTAGE COMPENSATION switches should all be ON. The POWER CONTROL switch should be in the TUNE position. The TRANSMITTER SELECTOR Switch should be set either to H.F. or I.F., depending on which transmitter is to be operated. As the adjustment of the High Frequency Transmitter will be discussed first, this switch should be placed in the H.F. position. The EMISSION switch should be set for C.W. operation.

6-4. The radio frequency adjustments must generally be made after the power is applied. However, the master oscillator range switch, M. O. RANGE Control "A"; master oscillator tuning control, M.O. TUNING Control "B"; doubler circuit range switch DOUBLER RANGE Control "C"; doubler circuit tuning control, DOUBLER TUNING Control "D"; intermediate amplifier range switch, I.A. RANGE Control "E"; and intermediate amplifier circuit tuning control, INT. AMP. TUNING Control "F" may be set by reference to the calibration chart. The power amplifier circuit tuning control, P.A. TUNING Control "G", may also be set approximately to frequency by the calibrated dial. The ANT. COUPLING, Control "K", should be set to zero. After checking the controls as above (assuming that the power supply is in operation), the POWER Switch on the Rectifier Unit should be moved to the "ON" position. This should cause the FILAMENT VOLTS meter on the Rectifier Unit to indicate. The voltmeter should be adjusted to indicate 10 volts, or to the red line, by turning the control marked "FILAMENT" until the meter indicates properly.

6-5. The flame-proof telegraph key with cable and plug should be inserted in the keying circuit by means of the KEY jack. Pressing the key should energize the keying relay. This applies 500 volts from the auxiliary rectifier to the master oscillator and intermediate amplifier circuit. If the keying relay does not operate, the side shields of both transmitters and the tube access door on the Rectifier Unit should be inspected to see that the interlock circuits are properly closed.

6-6. Press the telegraph key and resonate the doubler tuning circuit by means of the DOUBLER TUNING, Control "D". Resonance will be indicated by maximum grid current on the intermediate amplifier grid current meter (I.A. GRID CURRENT). Next, resonate the intermediate amplifier circuit by means of the INT. AMP. TUNING, Control "F". Resonance will be indicated by maximum grid current on the power amplifier grid current meter (P.A. GRID CURRENT). Set the POWER CONTROL Switch on the Rectifier Unit to the 1/4 tap. When the key is pressed this will apply approximately 1200 volts to the plate of the power amplifier tube. Press the key and resonate the power amplifier circuit. This is best accomplished by first setting the reading on P.A. TUNING Control "G" as closely as possible to the frequency desired by the calibrated dial and then, while observing the power amplifier plate current meter, P. A. PLATE CURRENT located in the Rectifier Unit, turn the control knob "G" in the direction which decreases the plate current. Adjust control "G" until the plate current dips downward to a minimum value. When the doubler circuit, intermediate amplifier and power amplifier circuits have been properly resonated the intermediate amplifier grid current meter, I.A. GRID CURRENT, will indicate approximately 6 milliamperes, while the power amplifier grid current meter P.A. GRID CURRENT, will indicate approximately 40 milliamperes, and the power amplifier plate current meter, P.A. PLATE CURRENT, will indicate approximately 45 milliamperes.

6-7. If the antenna that is connected to the transmitter is known to be an approximate half-wave for the frequency used, the ANTENNA FEED, control "H" should be set in the VOLTAGE or #2 position. If the antenna is approximately 1/4 or 3/4 of a wave-length long, the ANTENNA FEED, Control "H", should be set in the CURRENT or #1 position.

6-8. Assuming that the antenna is a half wave, the following is the procedure for tuning the antenna circuit. Adjust the antenna coupling, ANT. COUPLING, Control "K", to approximately 25 divisions. Set the antenna tuning capacitor, ANT. TUNING CAPACITOR, Control "I" at approximately 25 divisions. Set the antenna feed switch, ANTENNA FEED, Control "H", in the VOLTAGE or #2 position. Press the key and rotate the knob of the antenna tuning inductance, ANT. INDUCTANCE, Control "J" until a rise in power amplifier plate current, P.A. PLATE CURRENT, is noted. If no point can be found in the tuning of Control "J" that gives a rise in the P.A. PLATE CURRENT meter, set the antenna tuning capacitor, ANT. TUNING CAPACITOR, Control "I" to another value of capacity and repeat the tuning process with the antenna tuning inductance, ANT. INDUCTANCE, Control "J". When the point has been found at which resonance occurs and both Controls "I" and "J" have been adjusted for maximum indication on the power amplifier plate current meter, readjust the antenna coupling, ANT. COUPLING, Control K, until the power amplifier plate current meter indicates approximately 100 milliamperes. The power amplifier tuning P.A. TUNING, Control "G", should be readjusted for minimum power amplifier plate current each time the antenna tuning controls are changed.

HIGH FREQUENCY TRANSMITTER, TYPE CAY-52193 - FINAL ADJUSTMENT

6-9. With the equipment operating satisfactorily on the 1/4 power tap, set the POWER CONTROL switch to FULL power. Pressing the key will apply 2000 volts to the plate of the power amplifier tube. Press the key and readjust the power amplifier tuning, P.A. TUNING CONTROL "G", antenna tuning, ANT. TUNING CAPACITOR, Control "I", ANT. INDUCTANCE Control "J", and antenna coupling, ANT. COUPLING, Control "K" for optimum adjustment. The power amplifier plate current meter P.A. PLATE CURRENT should not exceed the red line or 175 milliamperes. The voltage compensation switches, A.C. VOLTAGE COMPENSATION, on the Rectifier Unit should now be set so that keying the transmitter does not cause the voltage, as indicated by the filament voltmeter, FILAMENT VOLTS, to fluctuate more than approximately 0.2 volts. These voltage compensation switches connect different amounts of capacity in series with the 800 cycle supply line. The correct amount of capacity will compensate for the varying power factor, which is caused by the change in load on the generator when the transmitter key is closed, and will therefore improve the regulation of the power equipment. In general, it has been found that a capacitance of approximately 4 microfarads is the correct compensation for full load operation. This is in addition to the 8 microfarads of fixed capacity that is continuously connected in the circuit.

If the antenna that is connected to the transmitter is known to be an approximate half-wave for the freq. used, the ANTENNA PEAK, control "E" should be set in the VERNIER of a wave-length dial, the ANTENNA KNOB, control "F", should be set in the COARSE or #1 position.

Assuming that the antenna is a half wave, the following is the procedure for tuning the antenna circuit. Adjust the antenna coupling, A.C. to zero, control "H" to approximately 50 divisions. Set the antenna tuning capacitor, ANT. TUNING, the antenna feed switch, ANTENNA FEED, control "I" in the VERTICAL or #2 position. Press the key and rotate the knob of the antenna tuning inductance, ANT. INDUCTANCE, control "J" until a rise in power amplifier plate current, P.A. PLATE CURRENT, is noted. If no point can be found in the tuning of control "J" that gives a rise in the P.A. PLATE CURRENT meter, set the antenna tuning capacitor, ANT. TUNING CONDS, control "I" to another value of capacity and repeat the tuning procedure with control "J", ANT. INDUCTANCE. When resonance occurs and both Control "I" and "J" have been adjusted for maximum indication on the power amplifier plate current meter, readjust the antenna coupling, A.C. COUPLING, control K, until the power amplifier plate current meter indicates approximately 1.0 milliampere. The power amplifier tuning, P.A. TUNING, control "G", should be readjusted for minimum power amplifier plate current each time the antenna tuning controls are changed.

With the equipment operating satisfactorily on the 1/4 power tap, set the POWER CONTROL switch to FULL power. Depress the key, will apply 2000 volts to the plate of the power amplifier tube. Press the key and readjust the power amplifier P.A. TUNING, control "G", for minimum plate current meter reading. Adjust the antenna coupling, A.C. COUPLING, control K, for a reading of 1.0 amperes on the power amplifier plate current meter. The power amplifier plate current meter should not exceed the red line or 175 milliamperes. The voltage compensation switches, A.C. VOLTAGE COMPENSATION, on the Power Amplifier may be set so as to obtain by the filament voltmeter, FILAMENT VOLTS, to indicate 10 volts. These volts correspond to the tube 800 cycle supply line. The correct amount of capacity will compensate for the varying power factor, which is caused by the change in load on the generator when the power amplifier is connected in the circuit.

6-10. When all adjustments are considered satisfactory they may be recorded for future reference. It is desirable also that the operator note all meter readings and other observations which may aid in resetting the equipment.

6-11. For tuning the equipment into a 1/4 or 3/4 wave antenna, the procedure is the same as for tuning into a 1/2 wave antenna except that the voltage-current feed switch, ANTENNA FEED, Control "H", is set in the CURRENT or #1 position.

Tuning the antenna should be accomplished by tuning for maximum power amplifier plate current, not to exceed 175 ma. on full power, with the antenna tuning controls, and for minimum power amplifier plate current with the power amplifier tuning control. When the equipment is correctly tuned in the VOLTAGE FEED position there will only be a small indication of antenna current on the R.F. ammeter. When the antenna is tuned in the CURRENT FEED position the procedure is the same but there will be an appreciable amount of antenna current on the R.F. ammeter. In either case the power is being delivered to the antenna.

CAUTION: Do not operate the power amplifier plate current at a value greater than 175 milliamperes as indicated by the red line on the meter (P.A. PLATE CURRENT).

INTERMEDIATE FREQUENCY TRANSMITTER, TYPE CAY-52192

PRELIMINARY ADJUSTMENT

6-12. Set the TRANSMITTER SELECTOR switch on the Rectifier Unit to the I.F. position. Set the POWER CONTROL switch to the TUNE position. The master oscillator range switch, M.O. RANGE, Control "A", the master oscillator tuning, M.O. TUNING Control "B", the power amplifier range switch, P.A. RANGE, Control "C" may be set to the desired frequency by reference to the calibration chart. Set the antenna coupling, ANT. COUPLING, Control "H", to the minimum or zero position. With the power supply in operation, closing the power switch on the Rectifier Unit and pressing the transmitter key will apply power to the transmitter unit. With the POWER CONTROL switch in the TUNE position, approximately 500 volts will be applied to the plate circuit of the master oscillator and intermediate amplifier. The power amplifier grid current meter, P.A. GRID CURRENT, should indicate approximately 40 milliamperes. Set the POWER CONTROL switch on the Rectifier Unit to the 1/4 power position. Press the telegraph key and resonate the power amplifier circuit by means of P.A. TUNING Control "D" for minimum power amplifier plate current as indicated on the P.A. PLATE CURRENT meter in the Rectifier Unit. Under this condition, pressing of the key applies approximately 1200 volts to the plate of the power amplifier tube. In the resonance position, the power amplifier plate current meter should be indicating approximately 45 milliamperes. To adjust the antenna circuit, first set the

antenna coupling, ANT. COUPLING, Control "H", to approximately 30 divisions. Set the ANT. LOAD, Control "E", on Step #1 and set the ANTENNA TUNING STEP, Control "F" on tap #1 and rotate the antenna tuning control ANT. TUNING Control "G" throughout the range of the dial from 0 to 100 divisions. If no indications of a rise in power amplifier plate current is noted on the P.A. PLATE CURRENT meter, set the ANTENNA TUNING STEP, Control "F", on tap #2 and repeat the rotation of the ANT. TUNING, Control "G". Repeat the process on each step of Control "F" until a rise in the power amplifier plate current is noted. If no condition is found that will give the desired rise in power amplifier plate current, set the ANT. LOAD, Control "E", on Step #2 and repeat the tuning process with Controls "F" and "G". If a rise in plate current still does not occur, repeat with Control "E" on Step #3. When the resonance point has been found, adjust the antenna coupling, ANT. COUPLING, Control "H", until the power amplifier plate current is 100 milliamperes.

INTERMEDIATE FREQUENCY TRANSMITTER, TYPE CAY-52192 - FINAL ADJUSTMENT

6-13. With the equipment operating satisfactorily on the 1/4 power tap, set the POWER CONTROL switch to the FULL power position and press the key. This will apply 2000 volts to the plate of the power amplifier tube. Adjust the antenna coupling, ANT. COUPLING, Control "H", until the power amplifier plate current is 175 milliamperes as indicated on P.A. PLATE CURRENT meter (pointer at the red line). Check the adjustment of the power amplifier tuning for best overall condition.

6-14. When these adjustments are considered satisfactory, they may be recorded for future reference. It is desirable, also, that the operator note all meter readings and other observations which may aid in the resetting of the equipment.

OPERATION WITH FIXED ANTENNA

6-15. When operating the Intermediate Frequency Transmitter into a fixed antenna, it will be necessary to cut in the extra load coil, provided in the transmitter, if the frequency to be used is below 400 kilocycles. This is accomplished by connecting the jumper, which is supplied, between the trailing wire antenna post and the input to the fixed antenna loading inductance. The fixed antenna is connected to the fixed antenna output post. The antenna tuning adjustments, as previously described, also apply when operating with the fixed antenna. When receiving at some frequencies the loading inductance in series with the antenna will resonate with other circuit components and will act as a wave trip to block out signals on these frequencies. For this reason when using the antenna for reception, in conjunction with the Intermediate Frequency Transmitter, the antenna load switch should be set on tap 4 (minimum loading) and the extra antenna load coil should be removed from the circuit.

antenna coupling, ANT. [illegible], Control "[illegible]", is approximately 30 divisions. Set the ANT. LOAD, Control "F", on Step #1 and set the ANTENNA TUNING STEP, Control "G" on tap #1 and rotate the antenna tuning control ANT. TUNING Control "H" throughout the range of the dial from 0 to 100 divisions. If no indication of a rise in power amplifier plate current is noted on the P.A. PLATE CURRENT meter, set the ANTENNA TUNING STEP, Control "G", on tap #2 and repeat the rotation of the ANT. TUNING, Control "H". Repeat the process on each step of Control "G" until a rise in the power amplifier plate current is noted. If no condition is found that will give the desired rise in power amplifier plate current, set the ANT. LOAD, Control "F", on Step #2 and repeat the tuning process with Controls "G" and "H". If a rise in plate current still does not occur, repeat with Control "F" on Step #3. When the resonance point has been found, adjust the antenna coupling, ANT. COUPLING, Control "[illegible]", until the power amplifier plate current is 100 milliamperes.

[illegible]

[illegible]. With the equipment operating satisfactorily on the 1/4 power tap, set the POWER CONTROL switch to the FULL power position and press the key. This will apply 2000 volts to the plate of the power amplifier tube. Adjust the antenna coupling, ANT. COUPLING, Control "[illegible]", until the power amplifier plate current is 175 milliamperes as indicated on P.A. PLATE CURRENT meter (pointer on the red line). Check the adjustment of the power amplifier tuning for best overall condition.

[illegible]. When [illegible] adjustments [illegible], [illegible] it is suggested [illegible]. It is [illegible] also, that the operator note all meter readings and other observations which may aid in the resetting of the equipment.

[illegible]

[illegible] a fixed antenna, it will be necessary to cut in the extra load coil, provided in the transmitter, if the frequency to be used is below 400 kilocycles. This is accomplished by connecting the jumper, which is supplied, between the trailing wire antenna post and the input to the fixed antenna loading inductance. The fixed antenna is connected to the [illegible] antenna output post. The [illegible] tuning [illegible], as previously described, also apply when operating [illegible] the fixed antenna. When receiving at some frequencies [illegible] [illegible] truly to block out signals on these frequencies. For this reason when using the antenna for reception, in conjunction with the intermediate frequency transmitter, the antenna load switch should be set on tap 4 (minimum loading) and the extra antenna load coil should be removed from the circuit.

CAUTION: When using the fixed antenna for Intermediate Frequency Transmitter operation, extreme caution should be taken to keep the fixed antenna lead-out well in the clear of other objects, as the voltages built up on the fixed antenna are extremely high. In general, the trailing wire antenna should be used for intermediate frequency operation, whenever possible.

FREQUENCY ADJUSTMENT FACILITIES

6-16. A binding post is provided on the High Frequency and Intermediate Frequency Transmitter, marked C.F.I. for connection to a Crystal Frequency Indicator. This binding post is connected to the master oscillator through a ground circuit in such a manner that sufficient energy will be provided to the Crystal Frequency Indicator to allow easy adjustment of the master oscillator to the desired frequency. It will be noted that on the High Frequency Transmitter CAY-52193, Control "A" has two sets of calibrations; the right hand set is the output frequencies of the transmitter and the left hand set, the operating frequency of the oscillator. The latter calibrations are for use only with the C.F.I. During checking or calibration of frequency, the POWER CONTROL Switch on the Rectifier Unit should be in the TUNE position. If desired, the receiver can also be used to monitor the transmitter to the same frequency as some receive signal. This is accomplished by first tuning the receiver, on C.W., then "zero" beat with the incoming signal; then, after first withdrawing the receiver plug from the receiver switch box and plugging the former directly into the latter, the (Manual) volume control setting is reduced and the transmitter master oscillator frequency varied until it is set to "zero" beat with the receiver, then its frequency equals that of the previously received signal. In order to avoid false settings, due to beat notes from harmonics, it is necessary that the operator assure himself, by the approximate calibration of the transmitter, that he is near the desired frequency before obtaining the exact setting with the aid of the Crystal Frequency Indicator or the receiver. After tuning the master oscillator to the correct frequency, the POWER CONTROL switch should be turned to the 1/4 power position and the intermediate amplifier and power amplifier tuning control should be adjusted for optimum operation.

MCW OPERATION

6-17. After the transmitters have been adjusted as previously described for CW operation, they may be operated on MCW by setting the EMISSION switch to MCW. No other change in adjustment is required.

SIDE TONE VOLUME CONTROL

6-18. With the transmitter in operation the amount of side tone delivered to the receiver can be varied by the SIDE TONE volume control on the Rectifier Unit. Turning the control clockwise increases the output of the side tone which should be adjusted for noise levels encountered in flight.

LENGTH OF ANTENNA

6-19. The specification of the antennas for which this equipment was designed are: fixed "V" antennas; fore and aft antennas; and trailing wire antennas not exceeding 350 feet long. The "V" antenna consists of a wire from the left wing to the vertical fin to the right wing. The distance across the open end of the "V" along the wing is approximately 104 feet. The lead-in may be from either leg of the "V", direct as possible to the transmitter unit.

6-20. The trailing wire antenna is the most satisfactory antenna for both units if maximum power output and strong signals are desired. In general, the longer the antenna, the greater will be the output power.

6-21. When using the Intermediate Frequency Transmitter, the trailing wire antenna may be made any convenient length; however, an antenna as long as practical should be used since the shorter antennas develop high voltages which may become dangerous.

6-22. When using the trailing wire antenna with the High Frequency Transmitter, increased radiation will be secured if the antenna is one-quarter, three-quarter or five-quarter wavelengths long for the frequency being used.

6-23. A table of recommended antenna lengths is given below. The use of shorter antennas is possible but is not recommended as a short antenna is very inefficient and builds up tremendous voltages within the transmitter. Such high voltages may arc to the frame or shields of the equipment causing damage or burning out fuses. These dangerous voltages will also be present on the antenna lead-in when using short antennas and if arc-over occurs, there is danger of fire. When occasion demands the use of a very short antenna, operate on <u>low power</u> if possible for safety's sake.

<u>Table of Recommended Antenna Lengths for Trailing Wire Antenna</u>

3000 kcs.	210 feet
4000 kcs.	150 feet
5000 kcs.	120 feet
6000 kcs.	100 feet
7000 kcs.	85 feet
8000 kcs.	70 feet
10000 kcs.	55 feet
12000 kcs.	45 feet
14000 kcs.	35 feet

The above antenna lengths, which are slightly below three-quarter wave resonance, have been chosen, since in general they give more satisfactory communication range than one-quarter wave resonant antennas.

ROUTINE OPERATION

6-24. When the High Frequency and Intermediate Frequency Transmitters have been tuned to the frequencies desired, the normal routine operation of this equipment is as follows:

1. Move the TRANSMITTER SELECTOR switch on Rectifier Unit to the transmitter unit desired.

2. Place the POWER switch in the ON position and check the filament voltmeter to see that it is indicating normal voltage.

3. No other adjustments are normally required, but it is desirable that the antenna current and plate current meters be occasionally observed to see that their indications are normal.

6-25. During normal operation, and for short stand-by periods the POWER Switch may be left in the ON position. However, at the completion of a communication, or if there is to be a long period of inactivity of the equipment, the POWER switch should be moved to the OFF position.

CHANGING FREQUENCIES

6-26. The following is the procedure required for shifting from one frequency to another:

(1) High Frequency Transmitter, Type CAY-52193

(a) Unlock all tuning dials.

(b) Set M.O. RANGE, Control "A".

(c) Set M.O. TUNING Control "B".

(d) Set DOUBLER RANGE, Control "C".

(e) Set DOUBLER TUNING Control "D".

(f) Set I.A. RANGE, Control "E".

(g) Set INT. AMP. TUNING, Control "F".

(h) Set P.A. TUNING, Control "G".

(i) Set ANTENNA FEED, Control "H".

In above antenna [illegible], which are ordinarily below ground
weather wave resonance, have been observed, which in general
they are more satisfactory communication range than quar-
ter wave resonant antenna.

(j) Set ANT. TUNING CAPACITOR, Control "I".

(k) Set ANT. INDUCTANCE, Control "J".

(l) Set ANT. COUPLING, Control "K".

(2) Intermediate Frequency Transmitter Type CAY-52192

(a) Unlock all tuning dials.

(b) Set M.O. RANGE, Control "A".

(c) Set M.O. TUNING Control "B".

(d) Set P.A. RANGE Control "C".

(e) Set P.A. TUNING, Control "D".

(f) Set ANT. LOAD, Control "E".

(g) Set ANTENNA TUNING STEP, Control "F".

(h) Set ANT. TUNING, Control "G".

(i) Set ANT. COUPLING, Control "H".

(j) If the fixed antenna is used, connect the jumper between the trailing wire output post and the fixed antenna input post and connect the fixed antenna to the fixed antenna output post.

PERFORMANCE

6-27. The power output rating of the Model GO-9 Aircraft Radio Transmitting Equipment is as follows:

Below 15,000 feet	Frequency	Watts C.W.	Watts M.C.W.
Trailing Wire Antenna	300-600	100	70
	3,000-13,000	125	87.5
	13,000-18,100	100	70
Fixed Antenna	300-600	50	35
	3,000-18,100	50	35
Above 15,000 feet			
Trailing Wire Antenna	300-600	70	49
	3,000-18,100	100	70
Fixed Antenna	300-450	10	7
	450-600	20	14
	3,000-18,100	40	28

6-28. The actual power output of the equipment will vary greatly depending on the efficiency of antennas used and will generally be much greater than the rated power output. For actual data regarding the power output performance, the reader is referred to the production test data or Fig. 32 in the back of this book. The power taken from the plane power source is also shown in this data.

RESETABILITY

6-29. The reset accuracy of the equipment is such that after adjusting the transmitter for operation at any frequency within its range, noting settings, and then completely detuning, it will be possible to reset the transmitter with an accuracy of .02% when approaching the setting in either direction. For best accuracy, however, it is good policy to make final adjustments in the direction in which the dial reading increases.

6-30. The accuracy of the typical calibration curves in this book is approximately plus or minus 2%.

VII. MAINTENANCE

ROUTINE INSPECTION

7-1. In the interest of avoiding trouble, the radio installation should be thoroughly inspected at least after every 30 hours of operation. Check particularly the following points:

Check for Looseness and Wear

(a) Loosening of the mountings of the units and the screws and nuts in general.

(b) Loosening of shielded conduit fittings.

(c) Loosening of airplane shielding and bonding, including breakage of pigtail straps or lugs.

(d) Weakening of fixed antenna due to breakage of strands, weakening of disconnect links, or cracks in elastic links.

(e) General condition of trailing wire antenna including broken strands at the connection to the weight.

(f) Loosening of the mountings of the antenna fairlead.

(g) Wearing of grooves in the fairlead bells. Rotate the end bells slightly, if necessary.

(h) Mechanical and electrical condition of all cables and plugs.

Cleaning and Adjusting:

(i) Check the condition of all fuses to see that their ferrules have not become corroded and clean them with fine crocus cloth, if necessary.

(j) Check all vacuum tube contacts to see that they have not become loose or corroded, and clean with fine crocus cloth if necessary.

(k) Examine the keying relay contacts for excessive wear. Do not adjust the relay unless absolutely necessary. Refer to Fig. 15 for necessary adjustment data.

(l) Wipe all ceramic insulators, switches, etc., free from dirt or dust.

(m) Rotating coils should be kept clean and free from dust. The roller and coil wire are silver coated and should require no attention. The brass rod on which the roller travels should, under normal conditions require no attention. Should the rod become corroded, it should be polished bright and clean with a very fine grade of crocus cloth. Make certain that no abrasive remains on the rod. Do not apply any lubricant to rod.

(n) Special attention should be given to the master oscillator range switches in both the High Frequency and Intermediate Frequency Transmitters. The contact surface should be kept clean and free from all lubricant. Do not clean with an abrasive. Use only a soft cloth and carbon tetrachloride. Avoid bending the thin switch blades during handling.

(o) Should the equipment be exposed to the effects of salt water spray, it should be wiped clean and dry, removing all traces of moisture. A very small amount of light oil on a soft cloth wiped over the etched nameplate will preserve the finish and prevent the corrosive action of salt water spray.

7-2. All of the aluminum used in the equipment has been treated to resist the effects of salt water spray. Should this surface treatment be scratched or broken, seal the exposed surface with clear lacquer. Care should be given to see that after any screws or nuts have been removed, the surfaces under the lockwashers are properly treated with clear lacquer. Electrical contact must be maintained, however, in the case of grounding screws.

REPLACEMENTS

7-3. The only components which may be normally expected to require occasional replacement are the vacuum tubes. In general, however, whenever the performance of the equipment is below its previous standard, the tubes should be checked by comparison with tubes known to be good.

7-4. If, due to abnormal conditions, other components such as transformers, reactors, resistors, etc., fail, they should be replaced by similar units as listed under the heading of "PARTS LIST - PART IX". Should it become

necessary to replace Transformer T-201, extreme care must be exercised when soldering the leads to the Type 1616 tubes so as not to disturb the spacing of the spark gap. Proper spacing should be 5/16 inch + 1/16 inch - zero inch.

LUBRICATION

7-5. The tuning dial bearings, the rotating coil bearings, variable capacitor bearings, and the switch bearings should be lubricated once every six months with a few drops of light penetrating oil, such as a good typewriter oil.

KEYING RELAY

7-6. Once a year or as required, the keying relay plunger should be removed from the relay and carefully wiped off using only a soft cloth and carbon tetrachloride. The plunger may be removed from the relay by removing the two top contact boards, the back stop nut and damper assembly (nut, screw, spring and plunger). Make certain that the plunger is thoroughly dry before reassembling the relay. No lubricant should be used. Readjust relay after reassembly per Figure 15.

VIII. LOCATION OF TROUBLES

WARNING !

OPERATION OF THIS EQUIPMENT INVOLVES THE USE OF HIGH VOLTAGES WHICH ARE DANGEROUS TO LIFE. OPERATING PERSONNEL MUST AT ALL TIMES OBSERVE ALL SAFETY REGULATIONS. DO NOT CHANGE TUBES OR MAKE ADJUSTMENTS INSIDE EQUIPMENT WITH HIGH VOLTAGE SUPPLY ON. DO NOT DEPEND UPON DOOR SWITCHES OR INTERLOCKS FOR PROTECTION BUT ALWAYS SHUT DOWN MOTOR GENERATOR OR OTHER POWER EQUIPMENT. UNDER CERTAIN CONDITIONS, DANGEROUS POTENTIALS MAY EXIST IN CIRCUITS WITH POWER CONTROLS IN THE OFF POSITION DUE TO CHARGES RETAINED BY CAPACITORS, ETC. TO AVOID CASUALTIES ALWAYS DISCHARGE AND GROUND CIRCUITS PRIOR TO TOUCHING THEM.

GREAT CARE SHOULD BE EXERCISED WHEN OPERATING THE EQUIPMENT WITH ANY OF THE SHIELDS REMOVED FOR PURPOSES OF OBSERVATION OR BENCH TESTING. THE MAIN POWER SWITCH SHOULD BE TURNED "OFF" AND THE HIGH VOLTAGE CIRCUITS GROUNDED BEFORE ANY INTERNAL PART IS TOUCHED WITH THE BARE HAND.

THE ATTENTION OF OFFICERS AND OPERATING PERSONNEL IS DIRECTED TO BUREAU OF ENGINEERING CIRCULAR LETTER NO. 5a OF 3 OCTOBER 1934, OR SUBSEQUENT REVISIONS THEREOF ON THE SUBJECT OF "RADIO-SAFETY PRECAUTIONS TO BE OBSERVED".

GENERAL

8-1. In case the equipment appears inoperative, it is suggested that before looking for defective circuits, the following points be determined:

a. Is the power supply connected?
b. Has the storage battery become discharged?
c. Is the POWER Switch on the Rectifier Unit turned ON and are all other switches in proper position?
d. Are all fused circuits complete and are the fuses making good contact in their clips?
e. Are all connecting plugs properly inserted and making good contact?
f. Have any vacuum tubes been damaged and do all filaments light properly?
g. Will the equipment operate when a different type of transmission is chosen by the emission switch?

8-2. For checking operation of the various circuits in attempting to locate any trouble, the most necessary instrument is a voltmeter having a resistance of approximately one thousand ohms per volt. An indicating circuit tester or "ohm-meter" will also prove of value for this work.

8-3. The various diagrams in the rear of this book will prove of value for tracing of circuits and trouble location. The actual wiring diagram should be referred to in preference to the simplified schematic diagram. On Fig. 32 are listed typical test currents and voltages, for various portions of the circuit, and for different types of emission. While these values will vary somewhat in different equipments and under different conditions, comparison of measured voltages and currents with the tabulated values will often prove of assistance.

INSUFFICIENT DISTANCE RANGE

8-4. This may be due to the following general causes:

a. Unsuitable frequencies. (Refer to Par. 5-5).

b. Insufficient altitude for connection by "direct ray". (Refer to Par. 5-2.)

c. Variable propogation condition - On high frequencies, considerable variation may occur from day to day. (Refer to Par. 5-5).

d. Unsuitable antenna - The best results are obtainable with a trailing wire antenna of greatest length which can be resonated. (Refer to Par. 6-23. Table of Recommended Antenna Length for Trailing Wire Antenna). Except at distances exceeding several hundred miles and on the higher frequencies, fixed antenna systems will not give as good range as the trailing antenna because of generally smaller dimensions and smaller freedom of radiation. Fixed antennas frequently have pronounced directional characteristics and "blind" angles.

e. Improper antenna connections - (Refer to Part VI.)

f. Poor antenna connections. Check contacts to upper fairlead bell and to antenna reel; also avoid antenna connecting leads which are too long and supported too closely to conducting parts of the fuselage.

g. Engine driven generator not turning up fast enough, due to clutch slippage or because plane engine is at idling speed.

FADING OR POOR SIGNAL QUALITY

8-5. Fading is encountered at both slow and rapid rate, sometimes so fast that it makes itself more evident by distortion of signals than by noticeable fluctuation in volume. Fading may often be reduced by changing to a different communication frequency. At distances up to one hundred miles, increased altitude will strengthen the "direct ray" and, hence, reduce fading. Some types of fixed antenna systems have strong directional properties and will give a signal variation similar to fading as the airplane is turning. A rough note in telegraph transmission sometimes is the result of airplane vibration effects, especially when transmitting on the higher frequencies. Vibrations may modulate the transmitter frequency by means of vibrating tuning capacitor plates, or by loose elements, especially in the master oscillator tubes. This may be checked by replacing the master oscillator tubes.

a. At high altitudes, if imperfectly aligned, air capacitor plates may give rise to sparking with resultant poor note quality.

b. An excessive "growl" or "rattle" modulation in the transmitter output, usually accompanied by a reduction in the supply voltage, may be due to a partial breakdown in the generator.

c. A vibration modulation or unsteady C.W. note may be due to the frequency control not being locked, transmitter not free to vibrate on rubber mountings, or antenna and lead-in vibrating.

d. Radio Frequency "lilt" or poor keying on C.W. or M.C.W. will be caused by improper setting of the A.C. voltage compensation.

SIGNALS OFF FREQUENCY

8-6. Signals steady but off frequency may be due to master oscillator calibration in error, slippage of the master oscillator capacitor, or dial on shaft. Calibration of the master oscillator should be checked occasionally, and if found to be more than ±2% off frequency as compared with curves Fig. 16 and 18 or previous calibrations, the dial readings should be brought back to previous calibration. This can be accomplished by adjusting C-101 in the Intermediate Frequency Transmitter and C-301 in the High Frequency Transmitter. Check points 300 Kcs. and 3000 Kcs. for the Intermediate Frequency and High Frequency Transmitters, respectively.

POWER SOURCE TROUBLES

8-7. Power supply troubles may be responsible for the following:

1. Keying relay refuses to operate:
   (a) Fuse F-203 open or blown.
   (b) Battery voltage low, insufficient to close relay.
   (c) Interlocks not closed.

2. Keying relay chatters when Key is closed:
   (a) Effect of flight vibration; improper adjustment of relay K-201, K-202.
   (b) Excessive resistance in battery line or connection.
   (c) Discharged battery.

3. Excessive voltage ripple in power supply (1600 cycles carrier modulation):

   (a) Ripple smoothing capacitor open or disconnected.

4. Keying relay operates and filaments light, but high Voltage D.C. not available:

   (a) H. V. rectifier tubes short or open.

R. F. CIRCUIT TROUBLES

8-8. 1. Circuit trouble in master oscillator circuit may be due to:

   (a) Poor contact in master oscillator range switch (Control A).
   (b) Damaged master oscillator tube; try replacing with spare.
   (c) Open grid leak.

2. Circuit trouble in intermediate amplifier and power amplifier circuits may be due to:

   (a) Improper tuning adjustment.
   (b) Open grid resistor.
   (c) Poor contact in range switches or rotating coil.
   (d) Insufficient excitation from master oscillator or intermediate amplifier. Try replacement tubes.

3. Trouble in antenna circuit and coupling may be due to:

   (a) Poor connection to the reel or upper fairlead fittings.

(b) Poor ground connection.
(c) Antenna relay contact not properly adjusted.
(d) Insufficient or improper lengths of antenna.
(e) Antenna current meter open.
(f) Electrical breakdown at lead-out insulator or in fairlead.

4. "Lilting" note, when keying, may be due to:

(a) Improper adjustment of A.C. voltage compensation.
(b) Lack of bonding.
(c) Slipping generator clutch.

5. Excessive ripple may be the result of:

(a) Rectifier filter capacitors open.
(b) Faulty range switch contacts.
(c) Defective master oscillator or rectifier tube.
(d) Shock-mountings not free (object wedged under or above transmitter).

SIDE TONE TROUBLES

8-9. 1. If side tone absent, look for:

(a) Faulty operation of contacts, 7 and 3 of K-201, K-202 keying relays.
(b) Resistors R-203 or R-202 open or shorted.
(c) Broken phone cord or faulty plugs.

2. If side tone is too weak, the trouble may be:

(a) Improper impedance or defective helmet.
(b) Poor contacts in K-201, K-202 keying relays.
(c) Defective volume control.

3. If side tone is too strong, the trouble may be:

(a) The adjustment of R-202 is set too high.
(b) R-203 shorted.

VOLTAGE BREAKDOWN

8-10. 1. Voltage breakdown may be caused by:

(a) Effect of high altitude (rarefied air).
(b) Keying relay contacts set too close.
(c) Moisture in plugs or jacks.
(d) Air capacitor plates out of alignment.
(e) Antenna too short.
(f) Insufficient antenna coupling.

RECEIVER TROUBLES

8-11. 1. Receiver howl or feedback may be caused by poor or improper adjustment of antenna back contacts of Keying Relays K-201, K-202.

2. No reception through Keying Relay:

(a) Receiver antenna contacts fail to close.

3. Reception weak:

(a) Receiver antenna alignment needs retrimming.

4. Receiver noisy.

(a) Chattering contacts in relay, needs re-adjusting.
(b) Faulty regulator or filter in generator control box.
(c) Poor bonding.

TABLE I

LIST OF MAJOR UNITS WITH APPLICABLE TYPE NUMBERS

FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

NAVY TYPE DESIGNATION	NAME OF MAJOR UNIT OR ACCESSORY	QUANTITY	MANUFACTURER'S DESIGNATION	WEIGHT	SYMBOL GROUP
CAY-52192	I.F. TRANSMITTER UNIT	1	DL-7502316 G-1	44 LBS	101 TO 199
CAY-20103	RECTIFIER UNIT	1	DL-7502318 G-1	40.5 LBS	201 TO 299
CAY-52193	H.F. TRANSMITTER UNIT	1	DL-7502317 G-1	47.5 LBS	301 TO 399
	SLIP COVERS	1	DL-7502162 G-1	1.9 LBS	
	MONITOR CABLES	2	7407521 G-1	1.25 LBS	
	VACUUM TUBES		DL-7502312 G-1	2.5 LBS	
				TOTAL 137.65 LBS	

TABLE I (CONTINUED)

PARTS LIST BY SYMBOL DESIGNATION FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DWG SPEC NUMBER	S#	MFR.	MFR. DESIG.	SPECIAL TOL. RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER
			SECTION 1							
			CAY-52192 I.F. TRANSMITTER UNIT (101 TO 199)							
			CAPACITORS							
	C-101	M.O. CALIBRATION RESET CAPACITOR	25 MMF. MAX., 5 MMF. MIN., VARIABLE, AIR				1	TYPE MC SPEC #1872		K-7809663 P1
*	C-102	M.O.TANK CAPACITOR	0.01 MFD. ±2%, 2000 V. EFF. TEST, MICA - FOR DIMENSIONS REFER TO DIG. 27 P3	-48590-D2	RE48AA131C		3			T-7607238 P2
*	C-103	M.O. TANK CAPACITOR	0.00275 MFD. ±2%, 2000 V. EFF. TEST, MICA FOR DIMENSIONS REFER TO FIG. 27 P3	-48805-D2	RE48AA131		3			T-7607238 P3
	C-104	NOT USED								
*	C-105	GRID BLOCKING CAPACITOR	0.002 MFD., 2500 V.D.C. TEST, 1200 V.D.C. WORKING, MICA - FOR DIMENSIONS REFER TO FIG. 27 P8	-48642-B10	RE48AA112		7			T-7607238 P4
	C-106	COMPENSATION CAPACITOR	BIMETALLIC (SPECIAL)				1			P-7706968 G1
*	C-107	M.O. PLATE BY-PASS CAPACITOR	0.01 MFD. 1000 V.D.C. TEST, 600 V.D.C. WORKING, MICA. FOR DIMENSIONS REFER TO FIG. 27 P8	-48487-10	RE48AA112L		7			T-7607238 P6
*	C-108	M.O. GRID BY-PASS CAPACITOR	SAME AS C-107	-48487-10						
*	C-109	FILAMENT BY-PASS CAPACITOR	2 X 0.1 MFD. ±15%, 400 V.D.C. WORKING, PAPER. FOR DIMENSIONS REFER TO FIG 27 P2	-48313-A			7			T-7607238 P8
*	C-110	FILAMENT BY-PASS CAPACITOR	PART OF C-109							
	C-111	I.A. GRID COUPLING CAPACITOR	30 MMF. MAX., 5.3 MMF. MIN., VARIABLE, AIR				2	TYPE HF-30 -X		T-7607238 P10
*	C-112	I.A. GRID BY-PASS CAPACITOR	SAME AS C-107	-48487-10						
*	C-113	I.A. CATHODE BY-PASS CAPACITOR	0.02 MFD., 1000 V.D.C. TEST, 600 V.D.C. WORKING, MICA. FOR DIMENSIONS REFER TO FIGURE 27, P8	-48428-10	RE48AA112L		7			T-7607238 P12
*	C-114	I.A. SCREEN BY-PASS CAPACITOR	SAME AS C-113	-48428-10						
*	C-115	I.A. PLATE COUPLING CAPACITOR	SAME AS C-113	-48428-10						

*SPARE PARTS FURNISHED REFER TO SPARE PARTS LIST FOR QUANTITIES.

TABLE I (CONTINUED)

PARTS LIST BY SYMBOL DESIGNATION FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DWG SPEC NUMBER	NAVY DWG SPEC S#	MFR.	MFR. DESIG.	SPECIAL TOL. RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER
			SECTION I (CONTINUED)							
			CAY-52192 I. F. TRANSMITTER UNIT (101 TO 199)							
			CAPACITORS (CONTINUED)							
*	C-116	I.A. PLATE BYPASS CAPACITOR	SAME AS C-107	-48487-10						
*	C-117	METER BYPASS - P.A. GRID CAPACITOR	0.006 MFD., 1000 V.D.C. TEST, 600 V.D.C. WORKING, MICA. FOR DIMENSIONS REFER TO FIG. 27 P8	-48410-10			7			T-7607238 P16
*	C-118	P.A. GRID BYPASS CAPACITOR	SAME AS C-107	-48487-10						
*	C-119	P.A. GRID SHUNTING CAPACITOR	0.00005 MFD., 2500 V.D.C. TEST, 1200 V.D.C. WORKING, MICA - FOR DIMENSIONS REFER TO FIG. 27 P8	-48744-B10			7			T-7607238 P18
*	C-120	P.A. FILAMENT BYPASS CAPACITOR	SAME AS C-113	-48428-10						
*	C-121	P.A. FILAMENT BYPASS CAPACITOR	SAME AS C-113	-48428-10						
*	C-122	P.A. SCREEN BYPASS CAPACITOR	SAME AS C-113	-48428-10						
*	C-123	P.A. SUPPRESSOR BYPASS CAPACITOR	SAME AS C-107	-48487-10						
*	C-124	P.A. TANK CAPACITOR	0.001 MFD. ±2%, 5000 V. EFFECTIVE TEST, MICA. FOR DIMENSIONS REFER TO FIG. 27 P4	-48337-2	RE48AA131C		7			T-7607238 P23
*	C-125	P.A. TANK CAPACITOR	0.0015 MFD. ±2%, 3000 V. EFFECTIVE TEST, MICA. FOR DIMENSIONS REFER TO FIG. 27 P4	-48510-B2	RE48AA131C		7			T-7607238 P24
*	C-126	P.A. PLATE BYPASS CAPACITOR	0.005 MFD., 3000 V. EFFECTIVE TEST, MICA FOR DIMENSIONS REFER TO FIG. 27 P4	-48406-5	RE48AA131C		7			T-7607238 P25
*	C-127	I.A. GRID SHUNTING CAPACITOR	0.00004 MFD., ±10%, 1000 V.D.C. TEST, 600 V.D.C. WORKING, MICA. FOR DIMENSIONS REFER TO FIG. 27 P8	-48667-B10	RE48AA112		7			T-7607238 P26

*SPARE PARTS FURNISHED REFER TO SPARE PARTS LIST FOR QUANTITIES.

TABLE I (CONTINUED)

PARTS LIST BY SYMBOL DESIGNATION FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DWG SPEC NUMBER	S#	MFR.	MFR. DESIG.	SPECIAL TOL. RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER
			SECTION 1 (CONTINUED)							
			CAY-52192 I.F. TRANSMITTER UNIT (101 TO 199)							
			INDUCTORS AND CHOKES							
	L-101	M.O. TANK COIL	SPECIAL - FOR DIMENSIONS AND WINDING DATA REFER TO FIG. 31				1			P-7706962 G1
*	L-102	M.O. PLATE CHOKE	2.5 MILLIHENRIES, 125 MIL. AMPS., D.C. RESISTANCE 50 OHMS, FOR DIMENSIONS REFER TO FIG. 28				1			M-7406562 G1
*	L-103	M.O. GRID CHOKE	SAME AS L-102							
*	L-104	I.A. GRID CHOKE	SAME AS L-102							
*	L-105	I.A. PLATE CHOKE	SAME AS L-102							
	L-106	I.A. BAND PASS CHOKE	SPECIAL				1			M-7407291 G1
*	L-107	P.A. GRID CHOKE	SAME AS L-102							
	L-108	P.A. TANK COIL	SPECIAL				1			T-7605208 G6
	L-109	ANTENNA TUNING COIL	300 MICROHENRIES, SPECIAL - FOR DIMENSIONS AND WINDING DATA REFER TO FIG. 31				1			T-7605211 G5
	L-110	ANTENNA LOADING COIL	550 MICROHENRIES, SPECIAL - FOR DIMENSIONS AND WINDING DATA REFER TO FIG. 31				1			P-7707866 G1
	L-111	FIXED ANTENNA LOAD COIL	INDUCTANCE 750 MICROHENRIES SPECIAL - FOR DIMENSIONS AND WINDING DATA REFER TO FIG. 31				1			P-7707869 G1
			ELECTRICAL INDICATING INSTRUMENTS							
*	M-101	P.A. GRID CURRENT METER	0 TO 100 MIL. AMP. D.C.	-22058A			1	TYPE NX-33		T-7607238 P40
*	M-102	ANTENNA CURRENT METER	0 TO 9 AMPS., R.F. EXPANDED SCALE	-22239A			1	TYPE NT-33		T-7607238 P41

*SPARE PARTS FURNISHED REFER TO SPARE PARTS LIST FOR QUANTITIES.

TABLE I (CONTINUED)

PARTS LIST BY SYMBOL DESIGNATION FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DWG SPEC NUMBER	S#	MFR.	MFR. DESIG.	SPECIAL TOL. RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER
			SECTION 1 (CONTINUED)							
			CAY-52192 I.F. TRANSMITTER UNIT (101 TO 199)							
			RESISTORS, POTENTIOMETERS							
*	R-101	M.O. GRID RESISTOR	20,000 OHMS ±10%, 3 WATTS, COMPOSITION FOR DIMENSIONS REFER TO FIG. 29 P10	-63289	RE13A372G		14			T-7607238 P43
*	R-102	I.A. GRID RESISTOR	10,000 OHMS ±5%, 20 WATTS, - FOR DIMENSIONS REFER TO FIG. 29 P2	-63016E	RE13A372J		6		EXCEPT WIRE TO BE 0.002 DIA.	T-7607238 P44
*	R-103	I.A. FILAMENT RESISTOR	1.33 OHMS ±5%, 10 WATTS - FOR DIMENSIONS TO FIG. 29 P1	-63812E	RE13A372J		6			T-7607238 P45
*	R-104	I.A. CATHODE RESISTOR	100 OHMS, 10 WATTS - FOR DIMENSIONS REFER TO FIG. 29 P1	-63676E	RE13A372J		6			T-7607238 P46
*	R-105	I.A. SCREEN RESISTOR	5000 OHMS ±5%, 20 WATTS - FOR DIMENSIONS REFER TO FIG. 29 P2	-63015E	RE13A372J		6			T-7607238 P47
*	R-106	POTENTIOMETER RESISTOR	12,500 OHMS, 60 WATTS, TAPPED WITH FIVE EQUAL VALUES - FOR DIMENSIONS REFER TO FIG. 29 P4	-63546E	RE13A372J		6			T-7607238 P48
*	R-107	POTENTIOMETER RESISTOR	SAME AS R-106	-63546E						
*	R-108	I.A. SERIES PLATE RESISTOR	2500 OHMS, 60 WATTS - FOR DIMENSIONS REFER TO FIG. 29 P3	-63080E	RE13A372J		6		EXCEPT WIRE TO BE 0.002 DIA.	T-7607238 P50
*	R-109	P.A. GRID RESISTOR	3000 OHMS, 20 WATTS - FOR DIMENSIONS REFER TO FIG. 29 P2	-63013E	RE13A372J		6			T-7607238 P51
*	R-110	P.A. SCREEN RESISTOR	3000 OHMS, 60 WATTS - FOR DIMENSIONS REFER TO FIG. 29 P3	-63081E	RE13A372J		6			T-7607238 P52
			SWITCHES							
	S-101	M.O. RANGE SWITCH	S.P., FIVE POSITION, TWO BREAKS PER CIRCUIT, 10 AMPS., 3000 V.D.C. ROTARY TYPE				1			P-7706461 G12
	S-102	P.A. RANGE SWITCH	D.P., SIX POSITION, ONE BREAK PER CIRCUIT, 10 AMPS., 3000 V.D.C. ROTARY TYPE				1			T-7606024 G1

*SPARE PARTS FURNISHED REFER TO SPARE PARTS LIST FOR QUANTITIES.

TABLE I (CONTINUED)

PARTS LIST BY SYMBOL DESIGNATION FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DWG SPEC NUMBER	S#	MFR.	MFR. DESIG.	SPECIAL TOL. RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER
			SECTION 1 (CONTINUED)							
			CAY-52192 I.F. TRANSMITTER UNIT (101 TO 199)							
			SWITCHES (CONTINUED)							
	S-103	ANTENNA TUNING SWITCH	S.P., FIVE POSITION, ONE BREAK PER CIRCUIT, 10 AMPS., 25,000 V.D.C., ROTARY TYPE				1			P-7707870 G2
	S-104	ANTENNA LOADING SWITCH	PART OF S-103, S.P. 3 POSITION, ONE BREAK PER CIRCUIT, 10 AMPS., 25,000 V.D.C., ROTARY TYPE							
*	S-105	SHIELD INTERLOCK	0.75 AMP., 125 V., ONE BREAK PER CIRCUIT NORMALLY OPEN, S.P. S.T., PUSH BUTTON TYPE				1			K-7810128 P1
			VACUUM TUBES							
*	V-101	I.F. MASTER OSCILLATOR		-801	RE13A600C		8	801		T-7607241 P1
*	V-102	I.F. INTERMEDIATE AMPLIFIER		-807	RE13A600C		1	807		T-7607241 P2
*	V-103	I.F. POWER AMPLIFIER		-803	RE13A600C		1	803		T-7607241 P3
			VACUUM TUBE SOCKETS							
	X-101	M.O. TUBE SOCKET	4 CONTACTS	-49327			11			P-7706776 P2
	X-102	I.A. TUBE SOCKET	5 CONTACTS	-49328			11			P-7706776 P3
	X-103	P.A. TUBE SOCKET	5 CONTACTS - JUMBO	-38356			1			P-7707434 G1

*SPARE PARTS FURNISHED REFER TO SPARE PARTS LIST FOR QUANTITIES.

TABLE I (CONTINUED)

PARTS LIST BY SYMBOL DESIGNATION FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DWG SPEC NUMBER	S#	MFR.	MFR. DESIG.	SPECIAL TOL. RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER
			SECTION 2							
			CAY-20103 RECTIFIER (201 TO 299)							
			CAPACITORS							
*	C-201	A.C. COMPENSATION CAPACITOR	8, 5, 4, 2, 1 MFD. ±15%, 250 V.A.C., 800 CYCLE, PAPER - FOR DIMENSIONS REFER TO FIG. 27, P6	-48707	RE13A488C		7			T-7607239 P1
*	C-202	MAIN RECT. FILTER CAPACITOR	3.0 MFD., ±10%, 2000 V.D.C. WORKING, "OIL FILLED" INERTEEN - FOR DIMENSIONS REFER TO FIG. 27, P5	-48906	RE13A488C		1	S#1087313		T-7607239 P2
*	C-203	P.A. PLATE METER BY-PASS CAPACITOR	SAME AS C-117	-48410-10						
*	C-204	AUX. RECT. FILTER CAPACITOR	1.0 MFD., ±10%, 1000 V.D.C. WORKING, PAPER - FOR DIMENSIONS REFER TO FIG 27 P7	-48835	RE48A147		7			T-7607239 P4
*	C-205	AUX. RECT. FILTER CAPACITOR	0.25 MFD. ±10%, 1000 V.D.C. WORKING, PAPER - FOR DIMENSIONS REFER TO FIG 27 P7	-481168	RE13A488C		7			T-7607239 P5
*	C-206	FIL. VOLTMETER BY-PASS CAPACITOR	SAME AS C-117	-48410-10						
*	C-207	SPARK FILTER CAPACITOR	2.0 MFD. ±10%, 400 V.D.C. WORKING, PAPER FOR DIMENSIONS REFER TO FIG 27 P1	-48403-A	RE13A488C		7			T-7607239 P7
	C-208	NOT USED								
*	C-209A	LINE INPUT FILTER CAPACITOR	0.1, 0.1, 0.1 MFD. ±15%, 400 V.D.C. WORKING, PAPER	-48713-A	RE13A488C		7	DYR-6111		T-7607239 P9
*	C-209B	LINE INPUT FILTER CAPACITOR	A PART OF C-209A							
*	C-209C	LINE INPUT FILTER CAPACITOR	A PART OF C-209A							
	C-210	NOT USED								
	C-211	NOT USED								
*	C-212A	LINE INPUT FILTER CAPACITOR	SAME AS C-109	-48313-A						
*	C-212B	LINE INPUT FILTER CAPACITOR	A PART OF C-212A							
			FUSES							
*	F-201	MAIN LINE FUSE	10 AMPS., 120 VOLTS				4	CAT #1095B		T-7607239 P13

*SPARE PARTS FURNISHED REFER TO SPARE PARTS LIST FOR QUANTITIES.

TABLE I (CONTINUED)

PARTS LIST BY SYMBOL DESIGNATION FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DWG SPEC NUMBER	S#	MFR.	MFR. DESIG.	SPECIAL TOL. RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER
			SECTION 2 (CONTINUED)							
			CAY-20103 RECTIFIER (201 TO 299)							
			FUSES (CONTINUED)							
*	F-202	MAIN LINE FUSE	SAME AS F-201							
*	F-203	D.C. POWER FUSE	10 AMPS., 250 VOLTS				4	CAT #1081		T-7607239 P15
			JACKS							
	J-201	KEY JACK	SINGLE CIRCUIT				5	TC-60		T-7607239 P17
	J-202	SIDE TONE JACK	SAME AS J-201							
	J-203	SIDE TONE JACK	SAME AS J-201							
	J-204	REC. RELAY GROUNDING JACK	SAME AS J-201							
			RELAYS							
*	K-201	H.F. KEYING RELAY	6 POLES, DOUBLE THROW, TWO BREAKS PER CIRCUIT 11-15 VOLTS ON COIL, RATING 1.43 TO 1.95 AMPS D.C.				1			T-7607239 P22
*	K-201A	CONTACT SPRING	FOR RELAY K-201				1			T-7607241 P8
*	K-201B	CONTACT SPRING	FOR RELAY K-201				1			T-7607241 P9
*	K-201C	CONTACT SPRING	FOR RELAY K-201				1			T-7607241 P10
*	K-201D	CONTACT SPRING	FOR RELAY K-201				1			T-7607241 P11
*	K-201E	CONTACT SPRING	FOR RELAY K-201				1			T-7607241 P12
*	K-201F	CONTACT SPRING	FOR RELAY K-201				1			T-7607241 P13
*	K-201G	CONTACT	FOR RELAY K-201				1			T-7607241 P14
*	K-201H	CONTACT	FOR RELAY K-201				1			T-7607241 P15
*	K-202	I.F. KEYING RELAY	SAME AS K-201							
*	K-202A	CONTACT SPRING	SAME AS K-201A							
*	K-202B	CONTACT SPRING	SAME AS K-201B							
*	K-202C	CONTACT SPRING	SAME AS K-201C							
*	K-202D	CONTACT SPRING	SAME AS K-201D							
*	K-202E	CONTACT SPRING	SAME AS K-201E							
*	K-202F	CONTACT SPRING	SAME AS K-201F							
*	K-202G	CONTACT	SAME AS K-201G							
*	K-202H	CONTACT	SAME AS K-201H							
			REACTORS							
*	L-201	AUX. RECT. FILTER CHOKE	1450 TURNS, 1 HENRY AT 0.2 AMP. D.C., D.C RESISTANCE 45 OHMS, TEST VOLTAGE 2000 V. 60 CYCLES, SEE FIG. 30 PART 4	-30340			1	L-332724		T-7607239 P24

*SPARE PARTS FURNISHED REFER TO SPARE PARTS LIST FOR QUANTITIES.

TABLE I (CONTINUED)

PARTS LIST BY SYMBOL DESIGNATION FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DWG SPEC NUMBER	NAVY DWG SPEC S#	MFR.	MFR. DESIG.	SPECIAL TOL. RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER
			SECTION 2 (CONTINUED) CAY-20103 RECTIFIER (201 TO 299)							
			ELECTRICAL INDICATING INSTRUMENTS							
*	M-201	P.A. PLATE CURRENT METER	0-300 MIL. AMP. D.C.	-22238A			1	TYPE NX-33		T-7607239 P25
*	M-202	FILAMENT VOLTMETER	0-15 V.A.C. (±2% AT 10 V.) 800 CYCLES	-22082A			1	TYPE NA-33		T-7607239 P26
			PLUGS AND RECEPTACLES							
*	P-1	TELEPHONE PLUG	PLUG FOR N.A.F. DWG. 310572				12			T-7607241 P19
*	P-201P	POWER PLUG	90° ELBOW, SIX CONTACTS				13			T-7607239 P28
	P-201S	POWER PLUG	RECEPTACLE				13			T-7607239 P29
			RESISTORS, POTENTIOMETERS							
*	R-201	FILAMENT RHEOSTAT	25 OHMS, FOR DIMENSIONS RFER TO FIG. 29, P7				10	CAT.#1108		T-7607239 P31
*	R-202	DISCHARGE RESISTOR	500,000 OHMS ±10%, 1 WATT, COMPOSITION, FOR DIMENSIONS REFER TO FIG. 29, P5	-63288	RE13A372G		14			T-7607239 P32
*	R-203	SIDE TONE SERIES RESISTOR	20 OHMS, 10 WATTS - FOR DIMENSIONS REFER TO FIG. 29, P1	-63003E	RE13A372J		6			T-7607239 P33
*	R-204	SIDE TONE VOLUME CONTROL	100 OHMS, 25 WATTS - FOR DIMENSIONS REFER TO FIG. 29, P8				10	CAT.#0151		T-7607239 P34
*	R-205	PROTECTIVE RESISTOR	1.0 MEGOHM, 1 WATT, COMPOSITION - FOR DIMENSIONS REFER TO FIG. 29, P5	-63288	RE13A372G		14			T-7607239 P35
*	R-206	DISCHARGE RESISTOR	1.0 MEGOHM ±15% - FOR DIMENSIONS REFER TO FIG. 29, P9	-63809-15			14	TYPE MVP		T-7607239 P36
*	R-207	CATHODE RESISTOR	1000 OHMS, 20 WATTS - FOR DIMENSIONS REFER TO FIG. 29, P2	-63011E	RE13A372J		6			T-7607239 P37
*	R-208	SPARK FILTER RESISTOR	100 OHMS, 1 WATT, COMPOSITION - FOR DIMENSIONS REFER TO FIG. 29, P5	-63288	RE13A372G		14			T-7607239 P38

*SPARE PARTS FURNISHED REFER TO SPARE PARTS LIST FOR QUANTITIES.

TABLE I (CONTINUED)

PARTS LIST BY SYMBOL DESIGNATION FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DWG SPEC NUMBER	S/#	MFR.	MFR. DESIG.	SPECIAL TOL. RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER
			SECTION 2 (CONTINUED)							
			CAY-20103 RECTIFIER (201 TO 299)							
			POTENTIOMETERS, RESISTORS (CONTINUED)							
*	R-209	AUX. RECT. BLEEDER RESISTOR	250,000 OHMS, 2 WATTS, COMPOSITION - FOR DIMENSIONS REFER TO FIG. 29 P6	-63474			14			T-7607239 P39
			SWITCHES							
	S-201	MAIN POWER SWITCH	D.P., S.T., ONE BREAK PER CIRCUIT, 10 AMPS 250 V., 15/32 BUSHING, TOGGLE TYPE				9	CAT #8244		T-7607239 P40
	S-202	D.C. POWER SWITCH	S.P., S.T., ONE BREAK PER CIRCUIT, 3 AMPS. 250 V, 15/32 BUSHING, TOGGLE TYPE				9	CAT #8360		T-7607239 P41
	S-203	POWER CONTROL SWITCH	S.P., FOUR POSITION, TWO BREAKS PER CIRCUIT, 10 AMPS., 120 V. 800 CY., ROTARY TYPE				1			P-7706464 G2
	S-204	A.C. COMPENSATION SWITCH	SAME AS S-202							
	S-205	A.C. COMPENSATION SWITCH	SAME AS S-202							
	S-206	A.C. COMPENSATION SWITCH	SAME AS S-202							
	S-207	A.C. COMPENSATION SWITCH	SAME AS S-202							
	S-208	H.F. - I.F. TRANSFER SWITCH	D.P., D.T., TWO BREAKS PER CIRCUIT, 10 AMPS ., 5000 V., ROTARY TYPE				1			T-7606024 G7
	S-209	CW - MCW SWITCH	S.P., D.T., TWO BREAKS PER CIRCUIT, 10 AMPS., 3000 V., ROTARY TYPE				1			P-7706461 G4
	S-210	INTERLOCK	SAME AS S-105							
	S-211	INTERLOCK	SAME AS S-105							
	S-212	INTERLOCK	SAME AS S-105							
	S-213	INTERLOCK	SAME AS S-105							

*SPARE PARTS FURNISHED REFER TO SPARE PARTS LIST FOR QUANTITIES.

TABLE I (CONTINUED)

PARTS LIST BY SYMBOL DESIGNATION FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DWG SPEC NUMBER	SH	MFR.	MFR. DESIG.	SPECIAL TOL. RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER
		SECTION 2 (CONTINUED)							
		CAY-20103 RECTIFIER (201 TO 299)							
		TRANSFORMERS							
* T-201	MAIN PLATE TRANSFORMER	0.4 K.V.A., FREQUENCY 800 CYCLES WDG. TAPS VOLTS AMPS TURNS RESIS OHMS D.C PRI. 1TO2 60 3.35 43 .38 ±15% PRI. 2TO3 60 3.35 42 .38 ±15% PRI. 3TO4 120 3.35 85 .76 ±15% S1 5TO6 1750 .110 1300 90 ±15% S2 5TO7 1750 .110 1300 90 ±15% TEST 1500 VOLTS SEE FIG. 30	-30647			1	L-382535		T-7607239 P54
* T-202	FILAMENT TRANSFORMER	0.195 K.V.A., FREQUENCY 800 CYCLES WDG. TAPS VOLTS AMPS TURNS RESIS. OHMS D.C. PRI. 1TO2 108 1.8 103 .73 ±15% S1 3TO4 2.5 10 2.5 .0042 S2 5TO6 5 3 5 .02 S3 9TO10 7.75 1.4 8 .04 S3 10TO11 7.75 1.4 7.5 .04 S4 7TO8 7.5 2.15 7.5 .027 S5 12TO13 10.5 10 10.5 .011 TEST 1500 VOLTS 60 CYCLES SEE FIG. 30	-30523			1	L-365778		T-7607239 P55
* T-203	AUX. RECT. TRANSFORMER	0.110 K.V.A., FREQUENCY 800 CYCLES WDG. TAPS VOLTS AMPS TURNS RESIS. OHMS D.C. PRI. 1TO2 120 1.05 117 1.46 S1 3TO CORE 8 0.001 8 0.25 S2 4TO5 540 0.2 525 19 S2 5TO6 540 0.2 525 19 TEST 2000 VOLTS SEE FIG. 30	-30401A			1	L-365788		T-7607239 P56

*SPARE PARTS FURNISHED REFER TO SPARE PARTS LIST FOR QUANTITIES.

TABLE I (CONTINUED)

PARTS LIST BY SYMBOL DESIGNATION FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DWG SPEC NUMBER	S#	MFR.	MFR. DESIG.	SPECIAL TOL. RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER
			SECTION 2 (CONTINUED)							
			CAY-20103 RECTIFIER (201 TO 299)							
			VACUUM TUBES							
*	V-201	HIGH VOLTAGE RECTIFIER		-1616	RE13A600C		8	1616		T-7607241 P4
*	V-202	HIGH VOLTAGE RECTIFIER	SAME AS V-201	-1616						
*	V-203	LOW VOLTAGE RECTIFIER		-5Z3			8	5Z3		T-7607241 P5
			VACUUM TUBE SOCKETS							
	X-201	RECT. TUBE SOCKET	SAME AS X-101	-49327						
	X-202	RECT. TUBE SOCKET	SAME AS X-101	-49327						
	X-203	RECT. TUBE SOCKET	SAME AS X-101	-49327						

*SPARE PARTS FURNISHED REFER TO SPARE PARTS LIST FOR QUANTITIES.

TABLE I (CONTINUED)

PARTS LIST BY SYMBOL DESIGNATION FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DWG SPEC NUMBER	NAVY DWG SPEC S#	MFR.	MFR. DESIG.	SPECIAL TOL. RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER
			SECTION 3							
			CAY-52193 H.F. TRANSMITTER (301 TO 399)							
			CAPACITORS							
	C-301	M.O. CALIBRATION RESET CAPACITOR	SAME AS C-101							
*	C-302	M.O. TANK CAPACITOR	0.00025 MFD., ±2%, 2500 V. EFF. TEST, MICA - FOR DIMENSIONS REFER TO FIG. 27 P4	-481134-Z2	RE48AA131		15			T-7607240 P2
*	C-303	M.O. TANK CAPACITOR	0.0006 MFD., ±2%, 2500 V. EFF. TEST, MICA FOR DIMENSIONS REFER TO FIG. 27 P4	-481135-Z2	RE48AA131		15			T-7607240 P3
*	C-304	M.O. TANK CAPACITOR	0.00075 MFD., ±2%, 2500 V. EFF. TEST, MICA - FOR DIMENSIONS REFER TO FIG. 27 P4	-481136-Z2	RE48AA131		15			T-7607240 P4
*	C-305	M.O. TANK CAPACITOR	0.003 MFD., ±2%, 2000 V. EFF. TEST, MICA FOR DIMENSIONS REFER TO FIG. 27 P4	-481137-Z2	RE48AA131		15			T-7607240 P5
*	C-306	M.O. TANK BYPASS CAPACITORS	SAME AS C-113	-48428-10						
*	C-307	M.O. FIL. BYPASS CAPACITOR	SAME AS C-107	-48487-10						
*	C-308	M.O. FIL. BYPASS CAPACITOR	SAME AS C-107	-48487-10						
*	C-309	M.O. SCREEN BYPASS CAPACITOR	SAME AS C-113	-48428-10						
*	C-310	M.O. PLATE BYPASS CAPACITOR	SAME AS C-107	-48487-10						
	C-311	M.O. PLATE COUPLING CAPACITOR	SAME AS C-101							
	C-312	DOUBLER CIRCUIT TUNING CAPACITOR	125 MMF. MAX., 12 MMF. MIN. VARIABLE AIR, 3000 V. PEAK				1	MTC-125B		T-7606108 P4
*	C-313	I.A. GRID BYPASS CAPACITOR	SAME AS C-107	-48487-10						
*	C-314	I.A.GRID COUPLING CAPACITOR	0.00004 MFD., 1000 V.D.C. TEST, 600 V.D.C. WORKING, MICA - FOR DIMENSIONS REFER TO FIG. 27 P8	-48667-B2			7			T-7607240 P14
*	C-315	I.A. GRID METER BYPASS CAPACITOR	SAME AS C-117	-48410-10						

*SPARE PARTS FURNISHED REFER TO SPARE PARTS LIST FOR QUANTITIES.

TABLE I (CONTINUED)

PARTS LIST BY SYMBOL DESIGNATION FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DWG SPEC NUMBER	S#	MFR.	MFR. DESIG.	SPECIAL TOL. RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER
			SECTION 3							
			CAY-52193 H.F. TRANSMITTER (301 TO 399)							
			CAPACITORS (CONTINUED)							
*	C-316	PADDING CAPACITOR	50 MMF. ±2%, 1000 V.D.C. TEST, 600 V.D.C. WORKING, MICA - FOR DIMENSIONS REFER TO FIG. 27 P9	-48394-D2	RE48AA112L		7			T-7607240 P16
*	C-317	I.A. SCREEN BYPASS CAPACITOR	SAME AS C-107	-48487-10						
*	C-318	I.A. SUPPRESSOR BYPASS CAPACITOR	SAME AS C-107	-48487-10						
*	C-319	I.A. PLATE BYPASS CAPACITOR	SAME AS C-107	-48487-10						
	C-320	I.A. TUNING CAPACITOR	150 MMF. MAX., 12 MMF. MIN., 3000 V. PEAK VARIABLE AIR	-			1	MTC-150-B		T-7606108 P2
*	C-321	P.A. GRID METER BYPASS CAPACITOR	SAME AS C-117	-48410-10						
*	C-322	P.A. GRID BYPASS CAPACITOR	SAME AS C-107	-48487-10						
*	C-323	P.A. FIL. BYPASS CAPACITOR	SAME AS C-107	-48487-10						
*	C-324	P.A. FIL. BYPASS CAPACITOR	SAME AS C-107	-48487-10						
*	C-325	P.A. SCREEN BYPASS CAPACITOR	SAME AS C-107	-48487-10						
*	C-326	P.A. SUPPRESSOR BYPASS	0.01 MFD., 1000 V.D.C. TEST, 600 V.D.C. WORKING, MICA - FOR DIMENSIONS REFER TO FIG. 27 P9	-48027-10	RE48AA112L		7			T-7607240 P26
*	C-327	P.A. PLATE BYPASS CAPACITOR	0.006 MFD., 2000 V. EFF. TEST, MICA - FOR DIMENSIONS REFER TO FIG. 27 P3	-481133-B5	RE48AA131		7			T-7607240 P27
	C-328	P.A. TUNING CAPACITOR	215 MMF. MAX., 10 MMF. MIN. PER SECTION, TWO SECTIONS, VARIABLE, AIR				2	TCD-210L		T-7607240 P28
	C-329	ANT. COUPLING CAPACITOR	75 MMF. MAX., 1 MMF. MIN., VARIABLE, AIR				4			T-7606020 G5
	C-330	ANT. TUNING CAPACITOR	110 MMF. MAX., 28 MMF. MIN., VARIABLE, AIR				2	TC-100-G		T-7607240 P30
	C-331	NOT USED								
	C-332	NOT USED								

*SPARE PARTS FURNISHED REFER TO SPARE PARTS LIST FOR QUANTITIES.

TABLE I (CONTINUED)

PARTS LIST BY SYMBOL DESIGNATION FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DWG SPEC NUMBER	S#	MFR.	MFR. DESIG.	SPECIAL TOL. RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER
			SECTION 3 (CONTINUED)							
			CAY-52193 H.F. TRANSMITTER (301 TO 399)							
			CAPACITORS (CONTINUED)							
*	C-333	M.O. FIL. BYPASS CAPACITOR	SAME AS C-107	-48487-10						
*	C-334	M.O. FIL. BYPASS CAPACITOR	SAME AS C-107	-48487-10						
*	C-335	P.A. GRID COUPLING CAPACITOR	SAME AS C-119	-48744-B10						
*	C-336	P.A. PLATE BYPASS CAPACITOR	SAME AS C-327	-481133-B5						
			INDUCTORS AND CHOKES							
	L-301	M.O. TANK COIL	FOR DIMENSIONS AND WINDING DATA REFER TO FIG. 31				1			P-7706924 G1
*	L-302	M.O. FILAMENT CHOKE	0.55 MILLIHENRIES, SPECIAL - FOR DIMENSIONS REFER TO FIG. 28				1	L-365730		T-7607240 P36
*	L-303	M.O. FILAMENT CHOKE	SAME AS L-302							
*	L-304	M.O. PLATE CHOKE	SAME AS L-102							
	L-305	DOUBLER COIL	FOR DIMENSIONS AND WINDING DATA REFER TO FIG. 31				1			P-7707847 G1
*	L-306	I.A. GRID CHOKE	SAME AS L-102							
	L-307	I.A. TANK COIL	FOR DIMENSIONS AND WINDING DATA REFER TO FIG. 31				1			P-7707847 G2
*	L-308	P.A. GRID CHOKE	SAME AS L-102							
	L-309	P.A. TANK COIL	FOR DIMENSIONS AND WINDING DATA REFER TO FIG. 31				1			T-7606012 G7
	L-310	ANTENNA TUNING COIL	FOR DIMENSIONS AND WINDING DATA REFER TO FIG. 31				1			T-7606012 G1

*SPARE PARTS FURNISHED REFER TO SPARE PARTS LIST FOR QUANTITIES.

TABLE I (CONTINUED)

PARTS LIST BY SYMBOL DESIGNATION FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DWG SPEC NUMBER	SPEC	MFR.	MFR. DESIG.	SPECIAL TOL. RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER
			SECTION 3 (CONTINUED)							
			CAY-52193 H.F. TRANSMITTER (301 TO 399)							
			ELECTRICAL INDICATING INSTRUMENTS							
*	M-301	I.A. GRID CURRENT METER	0-15 MIL. AMP. D.C.	-22135A			1	TYPE NX-33		T-7607240 P45
*	M-302	P.A. GRID CURRENT METER	SAME AS M-101	-22058A						
*	M-303	ANTENNA CURRENT METER	SAME AS M-102	-22239A						
			RESISTORS, POTENTIOMETERS							
	R-301	NOT USED								
*	R-302	M.O. GRID RESISTOR	SAME AS R-105	-63015E						
*	R-303	FILAMENT SHUNT RESISTOR	50 OHMS ±2%, 1 WATT, COMPOSITION - FOR DIMENSIONS REFER TO FIG. 29 P5	-63703-2	RE13A372J		14			T-7607240 P49
*	R-304	M.O. SCREEN RESISTOR	40,000 OHMS, 60 WATTS - FOR DIMENSIONS REFER TO FIG. 29 P3	-63372E	RE13A372J		8			T-7607240 P50
*	R-305	POTENTIOMETER RESISTOR	SAME AS R-106	-63546E						
*	R-306	POTENTIOMETER RESISTOR	SAME AS R-106	-63546E						
*	R-307	I.A. GRID RESISTOR	20,000 OHMS, 2 WATTS - FOR DIMENSIONS REFER TO FIG. 29 P6	-63426	RE13A372G		14			T-7607240 P53
	R-308	NOT USED								
*	R-309	I.A. SCREEN RESISTOR	SAME AS R-105	-63015E						
*	R-310	P.A. GRID RESISTOR	SAME AS R-109	-63013E						
*	R-311	P.A. SCREEN RESISTOR	SAME AS R-110	-63081E						
*	R-312	FILAMENT SERIES RESISTOR	4.5 OHMS, 20 WATTS - FOR DIMENSIONS REFER TO FIG. 29 P2	-63810			8			T-7607240 P57
*	R-313	FILAMENT SHUNT RESISTOR	SAME AS R-303	-63703-2						
*	R-314	SERIES SUPPRESSOR RESISTOR	SAME AS R-303	-63703-2						

*SPARE PARTS FURNISHED REFER TO SPARE PARTS LIST FOR QUANTITIES.

TABLE I (CONTINUED)

PARTS LIST BY SYMBOL DESIGNATION FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NUMBER	NAVY DWG SPEC NUMBER	S#	MFR.	MFR. DESIG.	SPECIAL TOL. RATING OR MODIFICATION	CONTRACTOR'S DWG. AND PART NUMBER
		SECTION 3 (CONTINUED)							
		CAY-52193 H.F. TRANSMITTER (301 TO 399)							
		SWITCHES							
S-301	M.O. RANGE SWITCH	D.P., FIVE POSITION, TWO BREAKS PER CIRCUIT, 10 AMPS., 3000 V., ROTARY TYPE				1			T-7606024 G11
S-302	DOUBLER CIRCUIT RANGE SWITCH	S.P., FIVE POSITION, TWO BREAKS PER CIRCUIT, 10 AMPS., 3000 V., ROTARY TYPE				1			P-7706461 G13
S-303	I.A. RANGE SWITCH	S.P., FIVE POSITION, TWO BREAKS PER CIRCUIT, 10 AMPS., 3000 V., ROTARY TYPE				1			P-7706461 G14
S-304	VOLTAGE CURRENT FEED SWITCH	D.P., D.T., 2 BREAKS PER CIRCUIT 10 AMPS. 10.000 V., ROTARY TYPE				1			P-7706966 G2
S-305	SHIELD INTERLOCK	SAME AS S-105							
S-306	SHIELD INTERLOCK	SAME AS S-105							
		VACUUM TUBES							
V-301	H.F. MASTER OSCILLATOR		-837	RE13A600C		16	837		T-7607241 P6
V-302	H.F. INT. AMPLIFIER	SAME AS V-301	-837						
V-303	H.F. POWER AMPLIFIER	SAME AS V-103	-803						
		VACUUM TUBE SOCKETS							
X-301	M.O. TUBE SOCKET	7 CONTACTS - LARGE	-49365			1			P-7706776 P5
X-302	I.A. TUBE SOCKET	SAME AS X-301	-49365						
X-303	P.A. TUBE SOCKET	SAME AS X-103	-38356						

*SPARE PARTS FURNISHED REFER TO SPARE PARTS LIST FOR QUANTITIES.

TABLE II

PARTS LIST BY NAVY TYPE NUMBERS

FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

NAVY TYPE DESIGNATION	NAME	SYMBOL GROUP
CAY-52192	I.F. TRANSMITTER UNIT	101 TO 199
CAY-20103	RECTIFIER UNIT	201 TO 299
CAY-52193	H.F. TRANSMITTER UNIT	301 TO 399

QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION
		INDICATING INSTRUMENTS (CLASS 22)	
2	-22058A	M-101, M-302	
1	-22082A	M-202	
1	-22135A	M-301	
1	-22238A	M-201	
2	-22239A	M-102, M-303	
		SWITCHES (CLASS 24)	
1		S-101	S.P., FIVE POSITION, TWO BREAKS PER CIRCUIT, 10 AMPS., 3000 V.D.C., ROTARY TYPE
1		S-102	D.P., SIX POSITION, ONE BREAK PER CIRCUIT, 10 AMPS., 3000 V.D.C., ROTARY TYPE
1		S-103	S.P., FIVE POSITION, ONE BREAK PER CIRCUIT, 10 AMPS., 25,000 V.D.C., ROTARY TYPE
1		S-104	PART OF S-103, S.P. 3 POSITION, ONE BREAK PER CIRCUIT, 10 AMPS., 25,000 V.D.C., ROTARY TYPE

TABLE 11 (CONTINUED)

PARTS LIST BY NAVY TYPE NUMBERS

FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION
		SWITCHES (CLASS 24) CONTINUED	
7		S-105, S-210, S-211, S-212, S-213, S-305, S-306	0.75 AMP., 125 V., ONE BREAK PER CIRCUIT, NORMALLY OPEN, S.P., S.T., PUSH BUTTON TYPE
1		S-201	D.P., S.T., ONE BREAK PER CIRCUIT, 10 AMPS., 250 V., 15/32 BUSHING, TOGGLE TYPE
5		S-202, S-204, S-205, S-206, S-207	S.P., S.T., ONE BREAK PER CIRCUIT, 3 AMPS., 250 V., 15/32 BUSHING, TOGGLE TYPE
1		S-203	S.P., FOUR POSITION, TWO BREAKS PER CIRCUIT, 10 AMPS., 120 V., 800 CYCLE ROTARY TYPE
1		S-208	D.P., D.T., TWO BREAKS PER CIRCUIT 10 AMPS., 5000 V., ROTARY TYPE
1		S-209	S.P., D.T., TWO BREAKS PER CIRCUIT, 10 AMPS., 3000 V., ROTARY TYPE
1		S-301	D.P., FIVE POSITION, TWO BREAKS PER CIRCUIT, 10 AMPS., 3000 V., ROTARY TYPE
1		S-302	S.P., THREE POSITION, TWO BREAKS PER CIRCUIT, 10 AMPS., 3000 V., ROTARY TYPE
1		S-303	S.P., FOUR POSITION, TWO BREAKS PER CIRCUIT, 10 AMPS., 3000 V., ROTARY TYPE
1		S-304	D.P., D.T., 2 BREAKS PER CIRCUIT, 10 AMPS., 10,000 V., ROTARY TYPE
		FUSES (CLASS 28)	
2		F-201, F-202	10 AMPS., 120 VOLTS
1		F-203	10 AMPS., 25 VOLTS

TABLE 11 (CONTINUED)

PARTS LIST BY NAVY TYPE NUMBERS

FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION
		RELAYS (CLASS 29)	
2		K-201, K-202	6 POLES, DOUBLE THROW, TWO BREAKS PER CIRCUIT 11-15 VOLTS ON COIL, RATING 1.43 TO 1.95 AMPS D.C.
		TRANSFORMERS & REACTORS (CLASS 30)	
1	-30340	L-201	
1	-30401A	T-203	
1	-30523	T-202	
1	-30647	T-201	
		VACUUM TUBES (CLASS 38)	
1	-5Z3	V-203	
1	-801	V-101	
2	-803	V-103, V-303	
1	-807	V-102	
2	-837	V-301, V-302	
2	-1616	V-201, V-202	
		VACUUM TUBE SOCKETS	
2	-38356	X-103, X-303	
4	-49327	X-101, X-201, X-202, X-203	
1	-49328	X-102	
2	-49365	X-301, X-302	

TABLE 11 (CONTINUED)

PARTS LIST BY NAVY TYPE NUMBERS

FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION
		INDUCTORS & CHOKES (CLASS 47)	
1		L-101	SPECIAL
8		L-102, L-103, L-104, L-105, L-107, L-304, L-306, L-308	2.5 MILLIHENRIES, 125 MILLIAMPS. D.C. RESISTANCE 50 OHMS
1		L-106	SPECIAL
1		L-108	SPECIAL
1		L-109	300 MICROHENRIES, SPECIAL
1		L-110	550 MICROHENRIES, SPECIAL
1		L-111	INDUCTANCE 750 MICROHENRIES, SPECIAL
1		L-301	SPECIAL
2		L-302, L-303	0.55 MILLIHENRY, SPECIAL
1		L-305	SPECIAL
1		L-307	SPECIAL
1		L-309	SPECIAL
1		L-310	SPECIAL
		CAPACITORS (CLASS 48)	
1	-48027-10	C-326	
4	-48313-A	C-109, C-110, C-212A, C-212B	
1	-48337-2	C-124	
1	-48403-A	C-207	
1	-48406-5	C-126	
5	-48410-10	C-117, C-203, C-206, C-315, C-321	
8	-48428-10	C-113, C-114, C-115, C-120, C-121, C-122, C-306, C-309	
19	-48487-10	C-107, C-108, C-112, C-116, C-118, C-123, C-307, C-308, C-310, C-313, C-317, C-318, C-319, C-322, C-323, C-324 C-325, C-333 C-334	

TABLE 11 (CONTINUED)

PARTS LIST BY NAVY TYPE NUMBERS

FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION
		CAPACITORS (CLASS 48) CONTINUED	
1	-48510-B2	C-125	
1	-48590-D2	C-102	
1	-48642-B10	C-105	
2	-48667-B10	C-127, C-314	
1	-48707	C-201	
1	-48713A	C-209A, C-209B C-209C	
2	-48744-B10	C-119, C-335	
1	-48805-D2	C-103	
1	-48835	C-204	
1	-48906	C-202	
2	-481133-B5	C-327, C-336	
1	-481134-Z2	C-302	
1	-481135-Z2	C-303	
1	-481136-Z2	C-304	
1	-481137-Z2	C-305	
1	-481168	C-205	
1		C-101	25 MMF. MAX., 5 MMF. MIN., VARIABLE.
1		C-106	BIMETALLIC (SPECIAL).
1		C-111	30 MMF. MAX., 5.3 MMF. MIN., VARIABLE.
1		C-312	125 MMF. MAX., 12 MMF. MIN., 3000 V. PEAK, VARIABLE.
1		C-328	215 MMF. MAX., 10 MMF. MIN., PER SECTION, TWO SECTIONS, VARIABLE.
1		C-329	75 MMF. MAX., 1 MMF. MIN., VARIABLE.
1		C-330	110 MMF. MAX., 28 MMF. MIN., VARIABLE.
		JACKS, PLUGS &	RECEPTACLES (CLASS 49)
4		J-201, J-202, J-203, J-204	SINGLE CIRCUIT, TC-60
4		P-1	TELEPHONE PLUG
1		P-201P	90° ELBOW, 6 CONTACT
1		P-201S	RECEPTACLE

TABLE 11 (CONTINUED)

PARTS LIST BY NAVY TYPE NUMBERS

FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION
		RESISTORS (CLASS 63)	
1	-63003E	R-203	
1	-63011E	R-207	
2	-63013E	R-109, R-310	
3	-63015E	R-105, R-302, R-309	
1	-63016E	R-102	
1	-63080E	R-108	
2	-63081E	R-110, R-311	
1	-63288	R-208	100 OHMS
1	-63288	R-202	500,000 OHMS
1	-63288	R-205	1 MEGOHM
1	-63289	R-101	20,000 OHMS
1	-63372E	R-304	
1	-63426	R-307	
1	-63474	R-209	250,000 OHMS
4	-63546E	R-106, R-107, R-305, R-306	
1	-63676E	R-104	
3	-63703-2	R-303, R-313, R-314	50 OHMS
1	-63809-15	R-206	
1	-63810	R-312	
1	-63812	R-103	
1		R-201	25 OHMS, FIL. RHEOSTAT
1		R-204	100 OHMS, 25 WATTS

TABLE 111
MAJOR UNITS WITH APPLICABLE TYPE NUMBERS
FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

NAVY NO.	NAME	SYMBOL GROUP
CAY-52192	I.F. TRANSMITTER UNIT	101 TO 199
CAY-20103	RECTIFIER UNIT	201 TO 299
CAY-52193	H.F. TRANSMITTER UNIT	301 TO 399

SPARE PARTS FOR ABOVE EQUIPMENT

CONTRACT NOs. 71360 DATED 31 DECEMBER 1940

SPARE PARTS		NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	MFR.	MFR. DESIG.	CONTRACTOR'S DRAWING AND PART NUMBER
OPERATING	BULK EACH 10 EQUIP.						
				ELECTRICAL INSTRUMENTS (CLASS 22)			
	1	-22058A	M-101, M-302	MILLIAMMETER, 0 TO 100 M.A. D.C.	1	TYPE NX-33	T-7607238 P40
	1	-22082A	M-202	VOLTMETER, 0 TO 15 V.A.C. (±2% AT 10 V.) 800 CYCLE	1	TYPE NA-33	T-7607239 P26
	1	-22135A	M-301	MILLIAMMETER, 0 TO 15 M.A. D.C.	1	TYPE NX-33	T-7607240 P45
	1	-22238A	M-201	MILLIAMMETER, 0 TO 300 M.A. D.C.	1	TYPE NX-33	T-7607239 P25
1	10	-22239A	M-102, M-303	AMMETER, 0 TO 9 AMPS., R.F. EXPANDED SCALE	1	TYPE NT-33	T-7607238 P41

TABLE 111 (CONTINUED)

FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

SPARE PARTS		NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	MFR.	MFR. DESIG.	CONTRACTOR'S DRAWING AND PART NUMBER
OPERATING	BULK EACH 10 EQUIP.						
				SWITCHES (CLASS 24)			
	1		S-105	SWITCH INTERLOCK 125 VOLTS, 0.75 AMP.	9	CAT #8410	T-7607238 P58
				FUSES (CLASS 28)			
1	10		F-201, F-202	FUSE MAIN LINE, 10 AMPS., 120 VOLTS	4	#1095-B	T-7607239 P13
1	10		F-203	FUSE D.C. POWER, 10 AMPS., 25 VOLTS	4	#1081	T-7607239 P15
				RELAYS (CLASS 29)			
	1		K-201, K-202	RELAY 11-15 VOLTS D.C. COIL RESIS. 7.7 OHMS ±10%	1		T-7607239 P22
1	10		K-201A, K-202A	CONTACT SPRING FOR K-201, K-202	1		T-7607241 P8
1	10		K-201B, K-202B	CONTACT SPRING FOR K-201, K-202	1		T-7607241 P9
1	10		K-201C, K-202C	CONTACT SPRING FOR K-201, K-202	1		T-7607241 P10
1	10		K-201D, K-202D	CONTACT SPRING FOR K-201, K-202	1		T-7607241 P11
1	10		K-201E, K-202E	CONTACT SPRING FOR K-201, K-202	1		T-7607241 P12

TABLE 111 (CONTINUED)

FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

SPARE PARTS		NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	MFR.	MFR. DESIG.	CONTRACTOR'S DRAWING AND PART NUMBER
OPERATING	BULK EACH 10 EQUIP.						
				RELAYS (CLASS 29) CONTINUED			
1	10		K-201F, K-202F	CONTACT SPRING FOR K-201, K-202	1		T-7607241 P13
1	10		K-201G, K-202G	CONTACT FOR K-201, K-202	1		T-7607241 P14
1	10		K-201H, K-202H	CONTACT FOR K-201, K-202	1		T-7607241 P15
				TRANSFORMERS AND REACTORS (CLASS 30)			
1	10	-30340	L-201	CHOKE 1.0 HENRY, 0.2 AMP.	1	L-332724	T-7607239 P27
1	10	-30401A	T-203	TRANSFORMER - AUX. RECT.	1	L-365788	T-7607239 P56
1	10	-30523	T-202	TRANSFORMER - FILAMENT	1	L-365778	T-7607239 P55
1	10	-30647	T-201	TRANSFORMER - MAIN PLATE	1	L-382535	T-7607239 P54
				VACUUM TUBES (CLASS 38)			
1	10	-5Z3	V-203	L.V. RECTIFIER	8	5Z3	T-7607241 P5
1	10	-801	V-101	I.F. M.O.	8	801	T-7607241 P1
1	10	-803	V-103, V-303	I.F. &. H.F. POWER AMPL.	1	803	T-7607241 P3
1	10	-807	V-102	I.F. INT. AMPL.	1	807	T-7607241 P2
1	10	-837	V-301, V-302	H.F. M.O. & INT. AMPL.	16	837	T-7607241 P6
1	10	-1616	V-201, V-202	H.V. RECTIFIER	8	1616	T-7607241 P4

TABLE 111 (CONTINUED)

FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

SPARE PARTS OPERATING	SPARE PARTS BLOCK EACH TYPE EQUIP.	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	MFR.	MFR. DESIG.	CONTRACTOR'S DRAWING AND PART NUMBER
				CHOKES (CLASS 47)			
1	10		L-102, L-103, L-104, L-105, L-107, L-304, L-306, L-308	R.F. CHOKE, 2.5 MILLIHENRIES	1	"COIL ONLY	K-7808974 P1
1	10		L-302, L-303	R.F. CHOKE INDUCTANCE 55 MILLIHENRIES ±5%	1		T-7607241 P22
				CAPACITORS (CLASS 48)			
1	10	-48027-10	C-326	0.01 MFD. ±10%, 1000 V.D.C. TEST, 600 V.D.C. WORKING, MICA	7		T-7607240 P26
1	10	-48313-A	C-109, C-110, C-212A, C-212B	2 X 0.1 MFD. ±15%, 400 V.D.C. WORKING, PAPER	7		T-7607238 P8
1	10	-48337-2	C-124	0.001 MFD. ±2%, 5000 V. EFF. TEST, MICA	7		T-7607238 P23
1	10	-48394-D2	C-316	50 MMF. ±2%, 1000 V.D.C. TEST, 600 V.D.C. WORKING, MICA	7		T-7607240 P16
1	10	-48403-A	C-207	2.0 MFD. ±10%, 400 V.D.C. WORKING, PAPER	7		T-7607239 P7
1	10	-48406-5	C-126	0.005 MFD. ±5%, 3000 V. EFF. TEST, MICA	7		T-7607238 P25
1	10	-48410-10	C-117, C-203, C-206, C-315, C-321	0.006 MFD. ±10%, 1000 V.D.C. TEST, 600 V.D.C. WORKING, MICA	7		T-7607238 P27

TABLE 111 (CONTINUED)

FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

SPARE PARTS		NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	MFR.	MFR. DESIG.	CONTRACTOR'S DRAWING AND PART NUMBER
OPERATING	BULK EACH 10 EQUIP.						
				CAPACITORS (CLASS 48) CONTINUED			
1	10	-48428-10	C-113, C-114, C-115, C-120, C-121, C-122, C-306, C-309	0.02 MFD. ±10%, 1000 V.D.C. TEST, 600 V.D.C. WORKING, MICA	7		T-7607238 P12
1	10	-48487-10	C-107, C-108, C-112, C-116, C-118, C-123, C-307, C-308, C-310, C-313, C-317, C-318, C-319, C-322, C-323, C-324, C-325, C-333, C-334	0.01 MFD. ±10%, 1000 V.D.C. TEST, 600 V.D.C. WORKING, MICA	7		T-7607238 P6
1	10	-48510-B2	C-125	0.0015 MFD. ±2%, 3000 V. EFF. TEST, MICA	7		T-7607238 P24
1	10	-48590-D2	C-102	0.01 MFD. ±2%, 2000 V. EFF. TEST, MICA	3		T-7607238 P2
1	10	-48642-B10	C-105	0.002 MFD. ±10%, 2500 V.D.C. TEST, 1200 V.D.C. WORKING, MICA	7		T-7607238 P4
1	10	-48667-B2	C-314	0.00004 MFD. ±2%, 1000 V.D.C. TEST, 600 V.D.C. WORKING, MICA	7		T-7607240 P14
1	10	-48667-B10	C-127	0.00004 MFD. ±10%, 1000 V.D.C. TEST, 600 V.D.C. WORKING, MICA	7		T-7607238 P26
1	10	-48707	C-201	8, 5, 4, 2, 1 MFD. ±15%, 250 V.A.C. 800 CYCLE, PAPER	7		T-7607239 P1

TABLE 111 (CONTINUED)

FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

SPARE PARTS		NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	MFR.	MFR. DESIG.	CONTRACTOR'S DRAWING AND PART NUMBER
OPERATING	BULK EACH 10 EQUIP.						
				CAPACITORS (CLASS 48) CONTINUED			
1	10	-48713-A	C-209A	0.1, 0.1, 0.1 MFD. ±15%, 400 V.D.C. WORKING, PAPER	15	DYR-6111	T-7607239 P9
			C-209B	A PART OF C-209A			
			C-209C	A PART OF C-209A			
1	10	-48744-B10	C-119, C-335	0.00005 MFD. ±10%, 2500 V.D.C. TEST, 1200 V.D.C. WORKING, MICA	7		T-7607238 P18
1	10	-48805-D2	C-103	0.00275 MFD. ±2%, 2000 V. EFF. TEST, MICA	3		T-7607238 P3
1	10	-48835	C-204	1.0 MFD. ±10%, 1000 V.D.C. WORKING, PAPER	7		T-7607239 P4
1	10	-48906	C-202	3.0 MFD. ±10%, 2000 V.D.C. WORKING, OIL FILLED	1	S#1087313	T-7607239 P2
1	10	-481133-B5	C-327, C-336	0.006 MFD. ±5%, 2000 V. EFF. TEST, MICA	7		T-7607240 P27
1	10	-481134-Z2	C-302	0.00025 MFD. ±2%, 2500 V. EFF. TEST, MICA	15		T-7607240 P2
1	10	-481135-Z2	C-303	0.0006 MFD. ±2%, 2500 V. EFF. TEST, MICA	15		T-7607240 P3
1	10	-481136-Z2	C-304	0.00075 MFD. ±2%, 2500 V. EFF. TEST, MICA	15		T-7607240 P4
1	10	-481137-Z2	C-305	0.003 MFD. ±2%, 2000 V. EFF. TEST, MICA	15		T-7607240 P5
1	10	-481168	C-205	0.25 MFD. ±10%, 1000 V.D.C. WORKING, PAPER	7		T-7607239 P5

TABLE 111 (CONTINUED)

FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

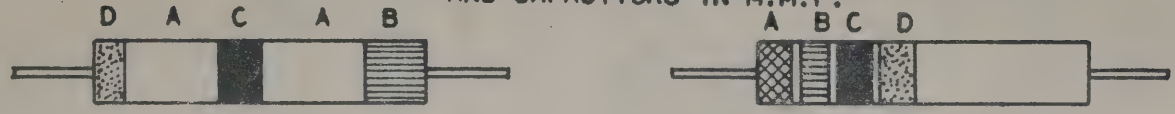
SPARE PARTS OPERATING	SPARE PARTS BULK EACH 10 EQUIP.	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	MFR.	MFR. DESIG.	CONTRACTOR'S DRAWING AND PART NUMBER
				PLUGS (CLASS 49)			
	1		P-1	PLUG, TELEPHONE N.A.F. DWGS. 310572	12		T-7607241 P19
	1		P-201P	PLUG, 90° ELBOW, SIX CONTACTS	13		T-7607239 P28
				WIRES AND CONDUCTORS (CLASS 62)			
	10 FT			CABLE 2 CONDUCTORS RUBBER INSULATED PER N.A.F. DWG. 47024, DASH NO. 202 (DO NOT CUT TO LENGTH)	1		T-7607241 P17
				RESISTORS (CLASS 63)			
1	10	-63003E	R-203	20 OHMS, 10 WATTS, STYLE F	6		T-7607239 P33
1	10	-63011E	R-207	1000 OHMS, 20 WATTS, STYLE E	6		T-7607239 P37
1	10	-63013E	R-109, R-310	3000 OHMS, 20 WATTS, STYLE E	6		T-7607238 P51
1	10	-63015E	R-105, R-302 R-309	5000 OHMS, ±5%, 20 WATTS, STYLE E	6		T-7607238 P47
1	10	-63016E	R-102	10,000 OHMS ±5%, 20 WATTS, STYLE E	6		T-7607238 P44
1	10	-63080E	R-108	2500 OHMS, 60 WATTS, STYLE D	6		T-7607238 P50
1	10	-63081E	R-110, R-311	3000 OHMS, 60 WATTS, STYLE D	6		T-7607238 P52

TABLE 111 (CONTINUED)

FOR MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

SPARE PARTS		NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	MFR.	MFR. DESIG.	CONTRACTOR'S DRAWING AND PART NUMBER
OPERATING	BULK EACH 10 EQUIP.						
				RESISTORS (CLASS 63) CONTINUED			
1	10	-63288	R-208	100 OHMS, 1 WATT, COMPOSITION	14		T-7607239 P38
1	10	-63288	R-202	500,000 OHMS ±10%, 1 WATT, COMPOSITION	14		T-7607239 P32
1	10	-63288	R-205	1 MEGOHM, 1 WATT, COMPOSITION	14		T-7607239 P35
1	10	-63289	R-101	20,000 OHMS, 3 WATTS, COMPOSITION	14		T-7607238 P43
1	10	-63372E	R-304	40,000 OHMS, 60 WATTS, STYLE D	6		T-7607240 P50
1	10	-63426	R-307	20,000 OHMS, 2 WATTS, COMPOSITION	14		T-7607240 P53
1	10	-63474	R-209	250,000 OHMS, 2 WATTS, COMPOSITION	14		T-7607239 P39
1	10	-63546E	R-106, R-107, R-305, R-306	12,500 OHMS, 60 WATTS, TAPPED 5 EQUAL VALUES, STYLE D	6		T-7607238 P48
1	10	-63676E	R-104	100 OHMS, 10 WATTS, STYLE F	6		T-7607238 P46
1	10	-63703-2	R-303, R-313, R-314	50 OHMS ±2%, 1 WATT	14		T-7607240 P49
1	10	-63809-15	R-206	1 MEGOHM ±15%	14	TYPE MVP	T-7607239 P36
1	10	-63810	R-312	4.5 OHMS, 20 WATTS, STYLE E	6		T-7607240 P57
1	10	-63812E	R-103	1.33 OHMS ±5%, 10 WATTS, STYLE F	6		T-7607238 P45
1	10		R-201	RHEOSTAT, 25 OHMS, 75 WATTS	10	CAT.#1108	T-7607239 P31
1	10		R-204	POTENTIOMETER, 100 OHMS, 25 WATTS	10	CAT.#0151	T-7607239 P34

RMA STANDARD COLOR CODE FOR RESISTORS IN OHMS AND CAPACITORS IN M.M.F.



OLD NEW

A-COLOR FOR 1ST SIGNIFICANT FIGURE.
B-COLOR FOR 2ND SIGNIFICANT FIGURE.
C- COLOR FOR NO. OF CIPHERS OR MULTIPLIER.
D-GOLD OR SILVER INDICATES TOLERANCE, WHEN APPLIED.

COLOR	SIGNIFICANT FIGURE	MULTIPLYING VALUE
BLACK	0	1
BROWN	1	10
RED	2	100
ORANGE	3	1,000
YELLOW	4	10,000
GREEN	5	100,000
BLUE	6	1,000,000
VIOLET	7	10,000,000
GRAY	8	100,000,000
WHITE	9	1,000,000,000
GOLD	±5% TOLERANCE	0.1
SILVER	±10% TOLERANCE	0.01
NO COLOR	±20% TOLERANCE	

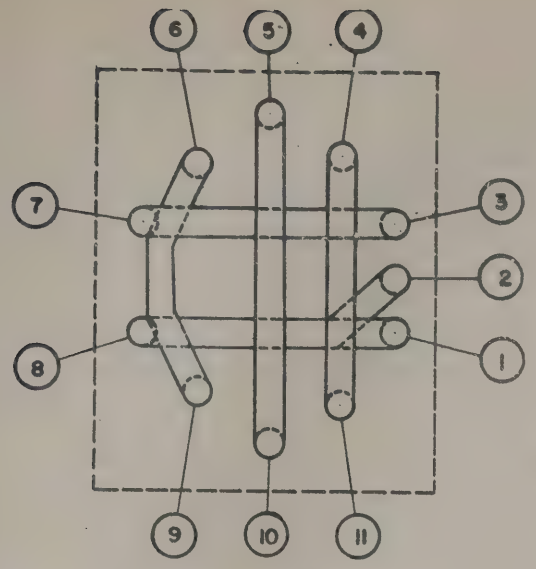
EXAMPLES

43,000 OHMS	YELLOW (4)	ORANGE (3)	ORANGE (X1000)
3,000 OHMS	ORANGE (3)	BLACK (0)	RED (X100)
3.3 OHMS	ORANGE (3)	ORANGE (3)	GOLD (0.1)

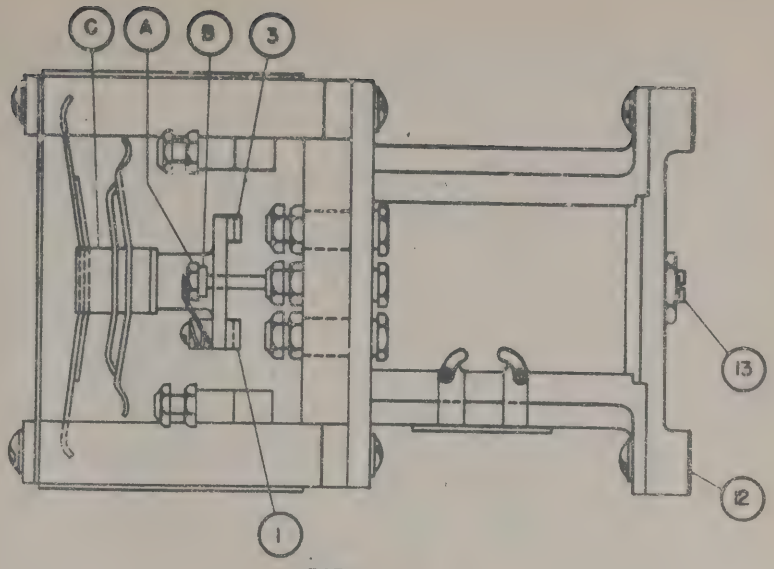
TABLE

INDEX TO MANUFACTURERS

CODE NUMBER	MFR. PREFIX	NAME	ADDRESS
1	CAY	WESTINGHOUSE ELECTRIC & MFG. CO.	2519 WILKENS AVENUE BALTIMORE, MARYLAND
2	CHC	HAMMARLUND MFG. CO.	424 WEST 33RD STREET NEW YORK, N.Y.
3	CD	CORNELL-DUBILIER COND. CORP.	SOUTH PLAINFIELD, N.J.
	CAW	AEROVOX CORP.	NEW BEDFORD, MASS.
4	CLF	LITTELFUSE, INC.	4757 RAVENSWOOD AVE. CHICAGO, ILL.
5	CTE	TELEPHONICS CORP.	350 WEST 31ST STREET NEW YORK, N.Y.
	CAO	WARD LEONARD ELECTRIC CO.	MT. VERNON, N.Y.
	CHD	HARDWICK-HINDLE, INC.	NEWARK, N.J.
6	CIR	INTERNATIONAL RESISTANCE CO.	PHILADELPHIA, PA.
	COM	OHMITE MANUFACTURING CO.	4835 W. FLOURNEY ST. CHICAGO, ILL.
	CD	CORNELL-DUBILIER COND. CORP.	SOUTH PLAINFIELD, N.J.
7	CAW	AEROVOX CORP.	NEW BEDFORD, MASS.
	CSL	SOLAR MFG. CO.	BAYONNE, N.J.
8	CRC	R.C.A. RADIOTRON CORP.	HARRISON, N.J.
9	CAE	CUTLER HAMMER, INC.	12TH & ST. PAUL AVE. MILWAUKEE, WISC.
10	COM	OHMITE MANUFACTURING CO.	4835 W. FLOURNEY ST. CHICAGO, ILL.
11	CNA	NATIONAL CO., INC.	61 SHERMAN ST. MALDEN, MASS.
12	CYM	P.R. MALLORY & CO., INC.	INDIANAPOLIS, IND.
13	CPH	AMERICAN PHENOLIC CORP.	1250 VAN BUREN ST. CHICAGO, ILL.
14	CIR	INTERNATIONAL RESISTANCE CO.	PHILADELPHIA, PA.
15	CD	CORNELL-DUBILIER COND. CORP.	SOUTH PLAINFIELD, N.J.
16	CWL	WESTINGHOUSE LAMP CO.	BLOOMFIELD, N. J.



TOP VIEW OF SPRING CONTACTS



LEGEND

(1) GRID END OF GRID-GROUNDING CONTACT
(2) RECEIVER END OF RECEIVER-GROUNDING CONTACT
(7) & (3) SIDE TONE CONTACTS
(11) & (4) POWER CONTACTS
(10) & (5) ANTENNA BACK CONTACTS
(9) & (6) ANTENNA TRANSMITTING CONTACTS
(8) GROUND END OF GRID AND RECEIVER GROUNDING CONTACTS
(12) RELAY BASE
(13) STUB & LOCKING NUT

CAUTION NOTE: REMOVE RELAY FROM SET AND MICA PLATES FROM RELAY BEFORE ATTEMPING TO MAKE ADJUSTMENTS. MAKE ALL ADJUSTMENTS BY RAISING OR LOWERING STATIONARY CONTACT STUDS. DO NOT BEND SPRING CONTACTS. IF POWER CONTACT (#11 AND #4) SPRINGS DO NOT SEAT PROPERLY WHEN CONTACT IS MADE, ADJUST BLOCKS CARRYING STUDS SO CONTACT FACES ARE PARALLEL TO SPRINGS. SLIDE A PIECE OF CROCUS CLOTH BACK AND FORTH LIGHTLY BETWEEN SPRING AND STUD TO CLEAN CONTACTS.

RELAY ADJUSTMENT PROCEDURE

1. REMOVE RELAY BASE (12) AND ADJUST STUB (13) TO BE 27/32 ± 1/64 HIGH AND REPLACE RELAY BASE (12).
2. BE CERTAIN PLUNGER IS SEATED AT BOTTOM.
3. RAISE PLUNGER .030" FROM BOTTOM.
4. ADJUST POWER CONTACTS #4 & #11 TO JUST MAKE CONTACT.
5. ADJUST GRID END #1 OF GRID-GROUNDING CONTACT TO JUST MAKE CONTACT.
6. RAISE PLUNGER AN ADDITIONAL .010" MAKING A TOTAL OF .040" FROM BOTTOM.
7. ADJUST SIDE TONE CONTACTS #3 & #7 TO JUST MAKE CONTACT.
8. ADJUST TRANSMITTING ANTENNA CONTACTS #6 & #9 TO JUST MAKE CONTACTS.
9. ADJUST GROUND END #8 AND RECEIVER END #2 OF GRID AND RECEIVER GROUNDING CONTACTS TO JUST MAKE CONTACT.
10. RAISE PLUNGER AN ADDITIONAL .135", MAKING A TOTAL OF .175" FROM BOTTOM.
11. ADJUST ANTENNA BACK CONTACTS #5 & #10 TO JUST MAKE CONTACT.
12. RAISE PLUNGER AN ADDITIONAL .040" MAKING A TOTAL OF .215" FROM BOTTOM.
13. ADJUST LOCKNUT "A" SO THAT LEATHER WASHER "B" IS JUST SEATED AGAINST CERAMIC CENTER CONTACT SUPPORT "C"
14. ANY SLIGHT BOUNCE REMAINING AFTER ABOVE ADJUSTMENTS HAVE BEEN MADE MAY BE REMOVED BY SLIGHT READJUSTMENT OF STUB (13).
15. AFTER ADJUSTMENT OF CONTACTS, CHECK ALL STUD LOCKNUTS AND MAKE CERTAIN THEY ARE TIGHT BEFORE REASSEMBLING RELAY.

FIG. 15 KEYING RELAY ADJUSTMENT (DRAWING P-7708688).

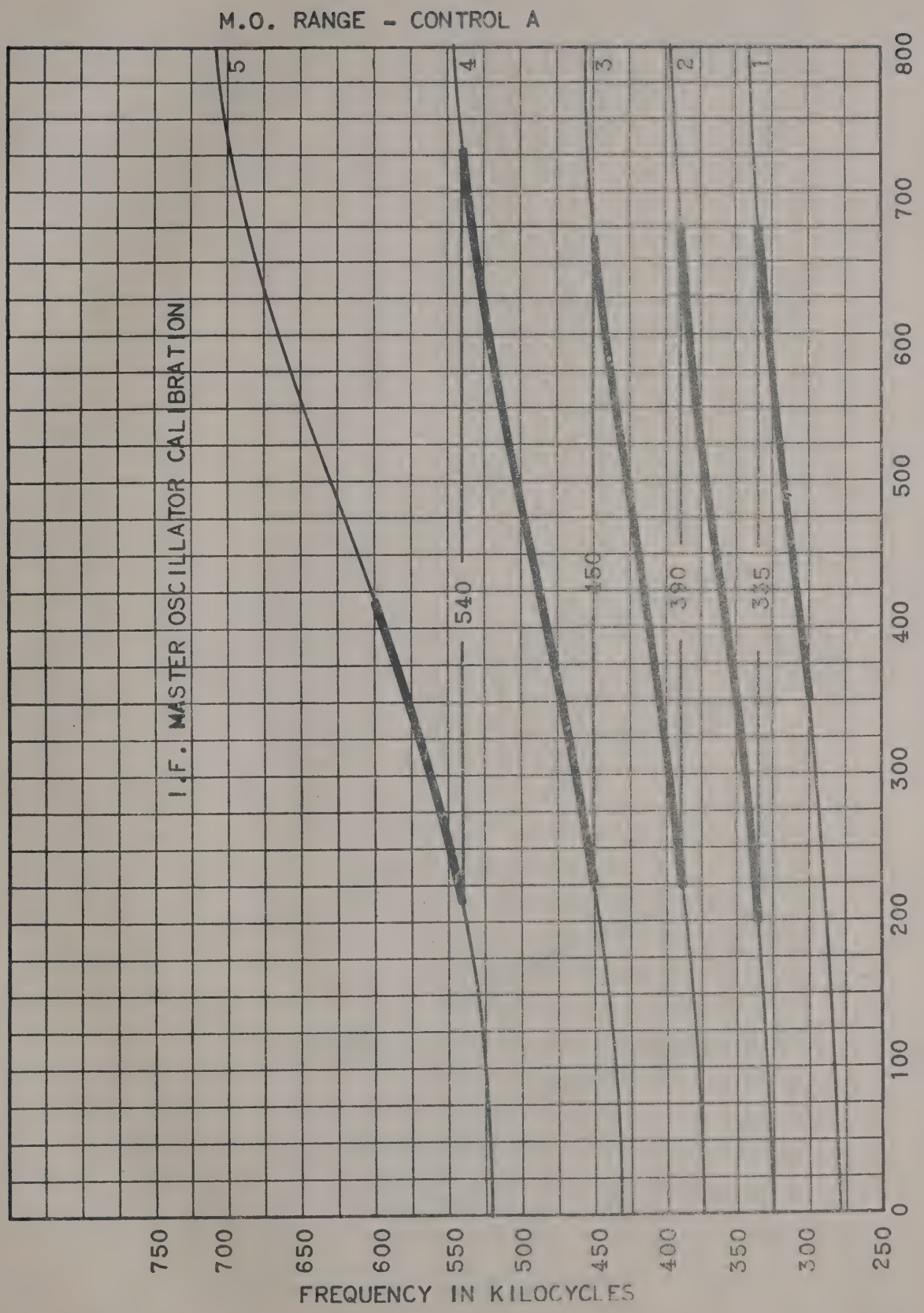


FIGURE 16 AVERAGE FREQUENCY CALIBRATION CURVE OF MASTER OSCILLATOR, INTERMEDIATE FREQUENCY TRANSMITTER TYPE CAY-52192, CONTROLS A AND B (CURVE 250055-A)

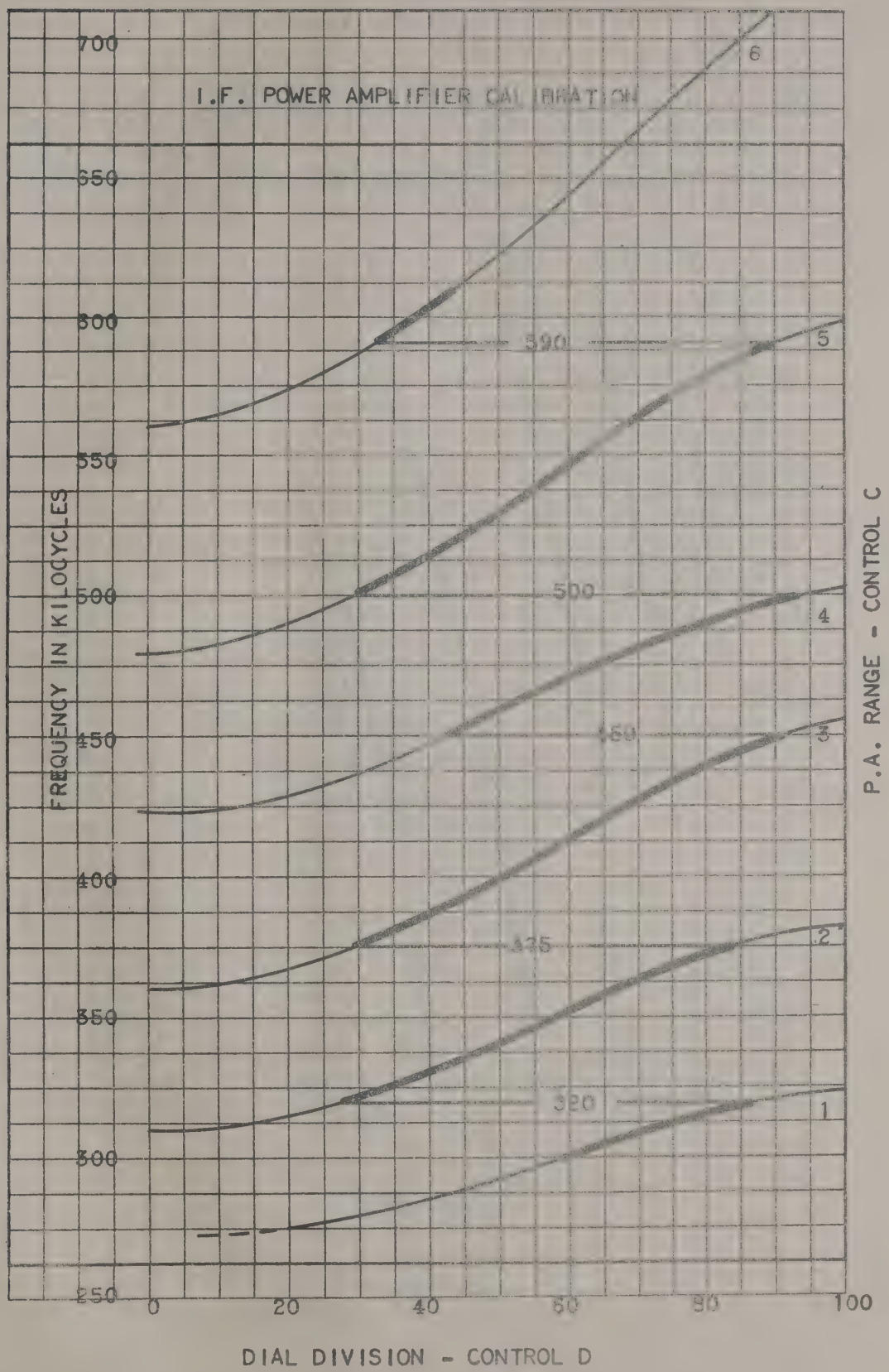


FIGURE 17 AVERAGE FREQUENCY CALIBRATION CURVE OF POWER AMPLIFIER, INTERMEDIATE FREQUENCY TRANSMITTER TYPE CAY-52192, CONTROLS C AND D (CURVE 250058-A)

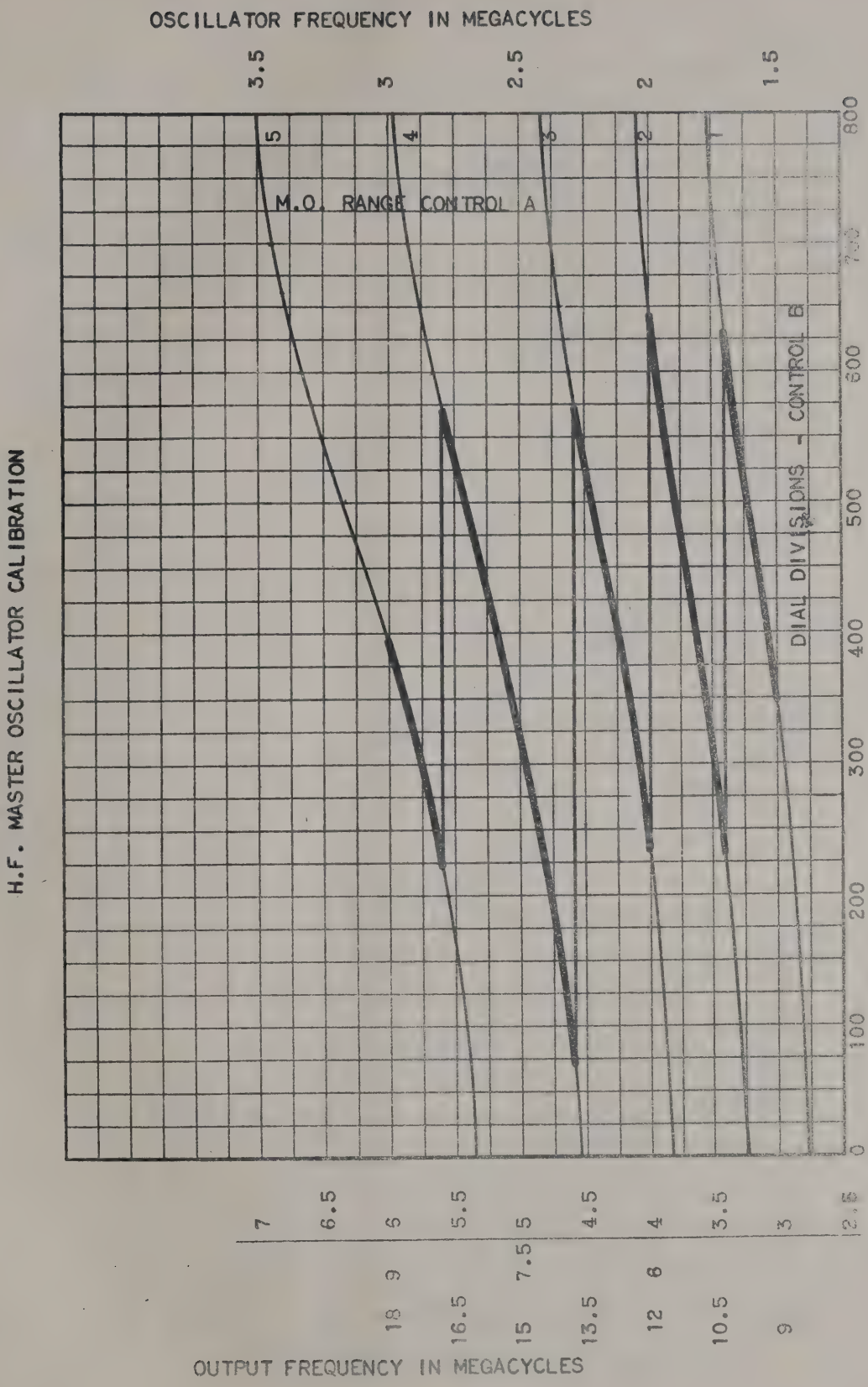


FIGURE 18 AVERAGE FREQUENCY CALIBRATION CURVE OF MASTER OSCILLATOR, HIGH FREQUENCY TRANSMITTER TYPE CAY-52193, CONTROLS A AND B (CURVE 264414-A)

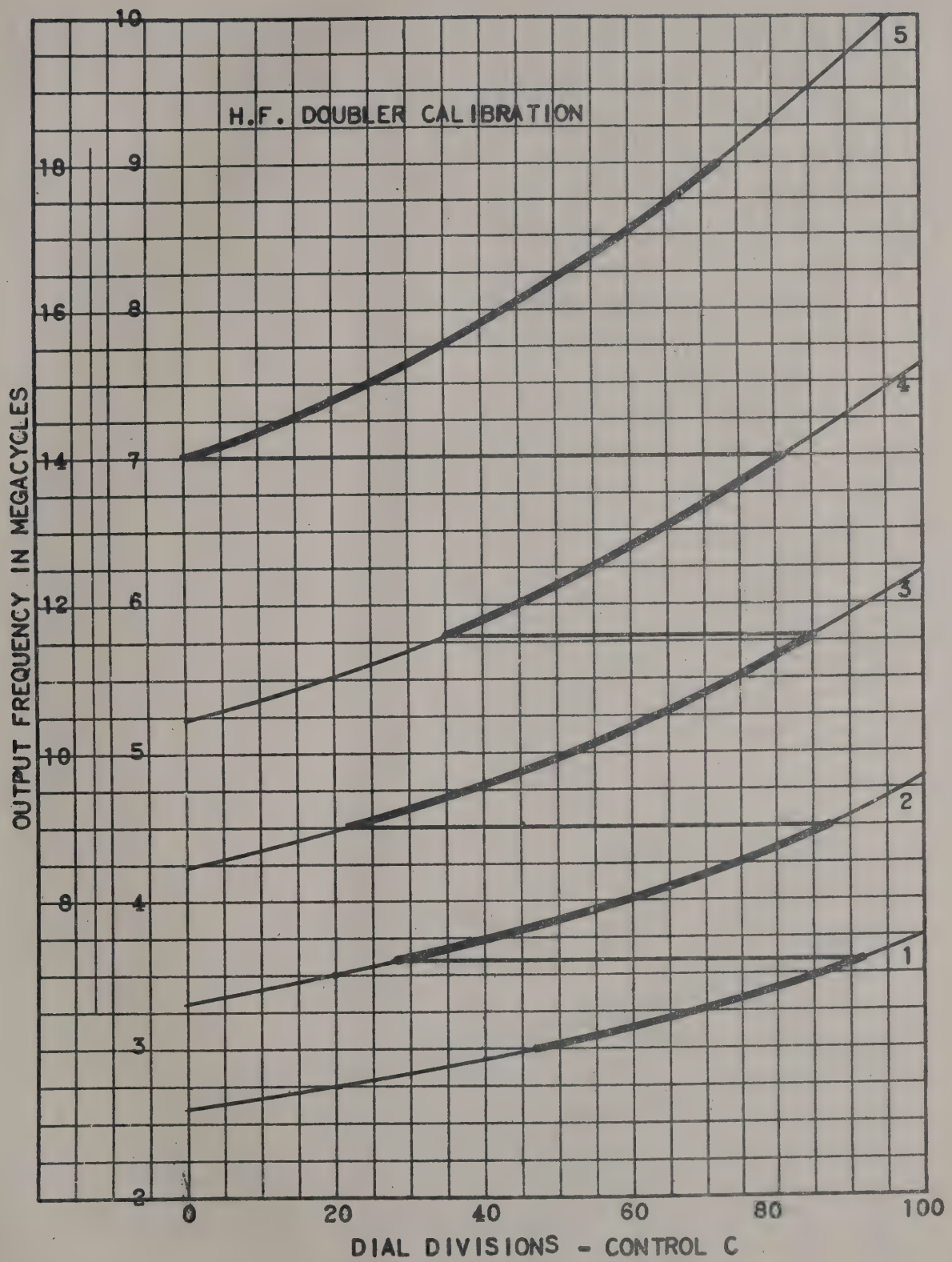


FIGURE 19 AVERAGE FREQUENCY CALIBRATION CURVE OF DOUBLER CIRCUIT, HIGH FREQUENCY TRANSMITTER TYPE CAY-52193, CONTROLS C AND D (CURVE 264415-A)

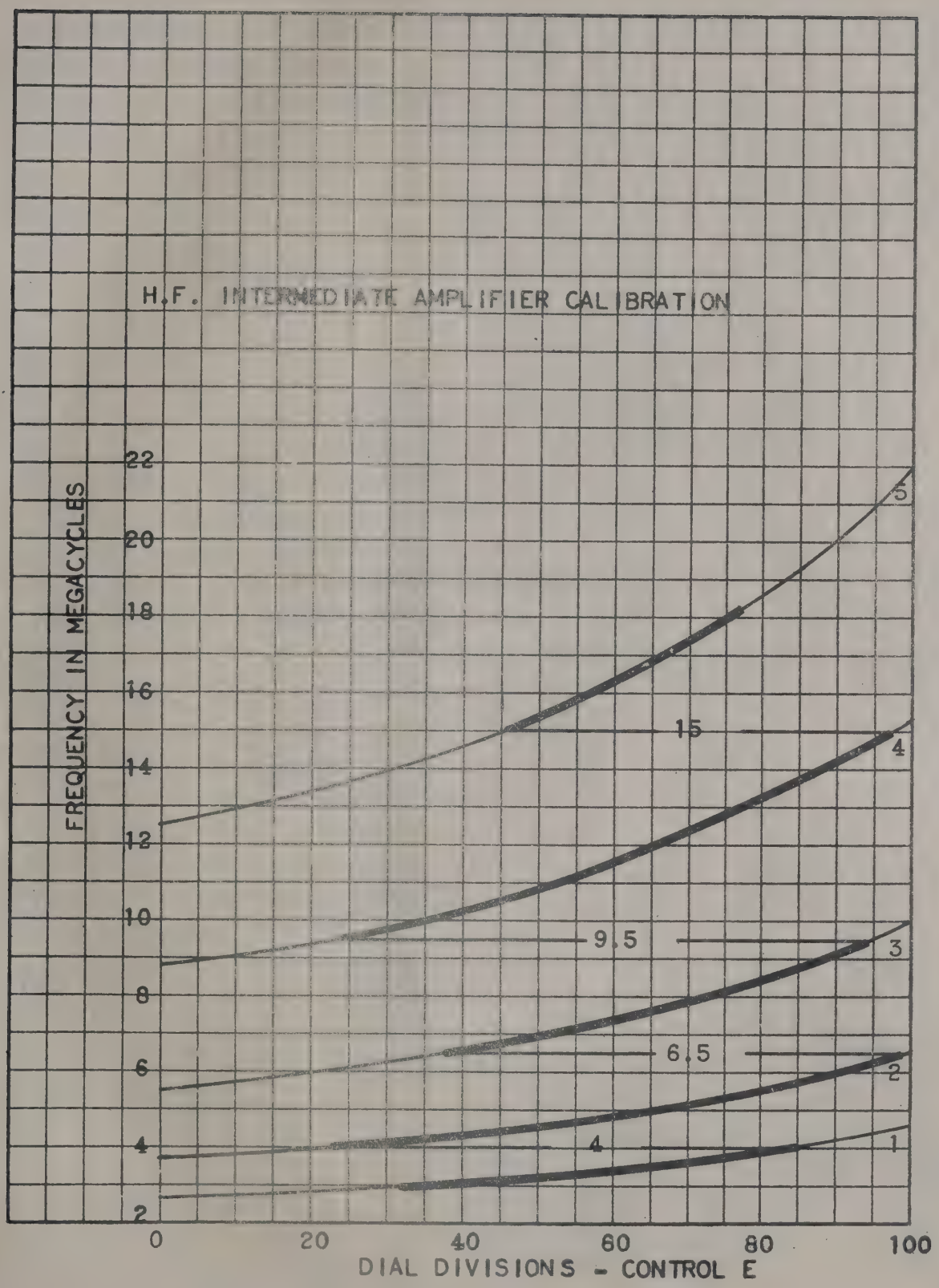
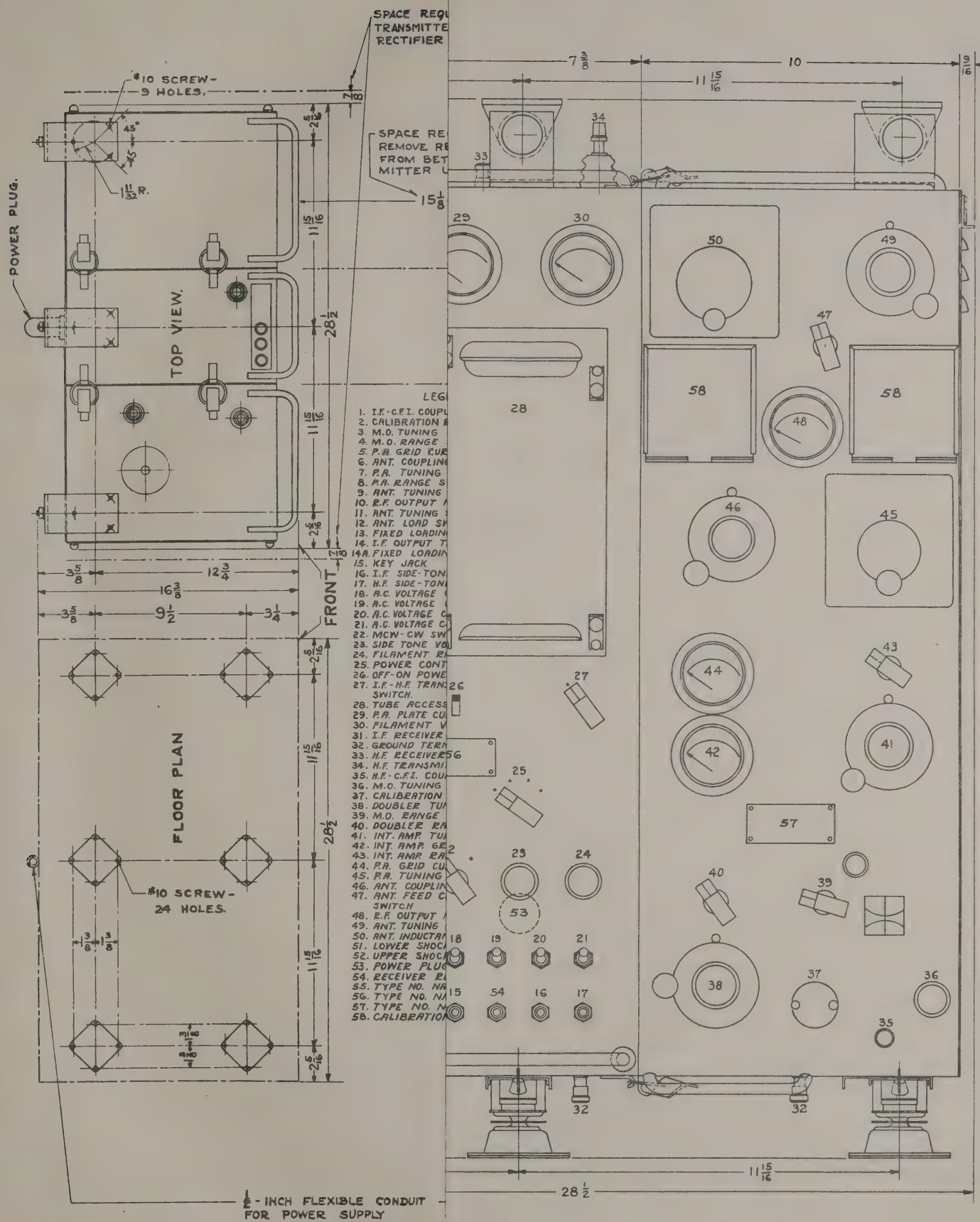


FIGURE 20 AVERAGE FREQUENCY CALIBRATION CURVE INTERMEDIATE AMPLIFIER, HIGH FREQUENCY TRANSMITTER, TYPE CAY-52193, CONTROLS E AND F (CURVE 264416-A)



ter-Rectifier Assembly Model GO-9 Out-
Mounting Dimensions (Dwg. T-7607354).

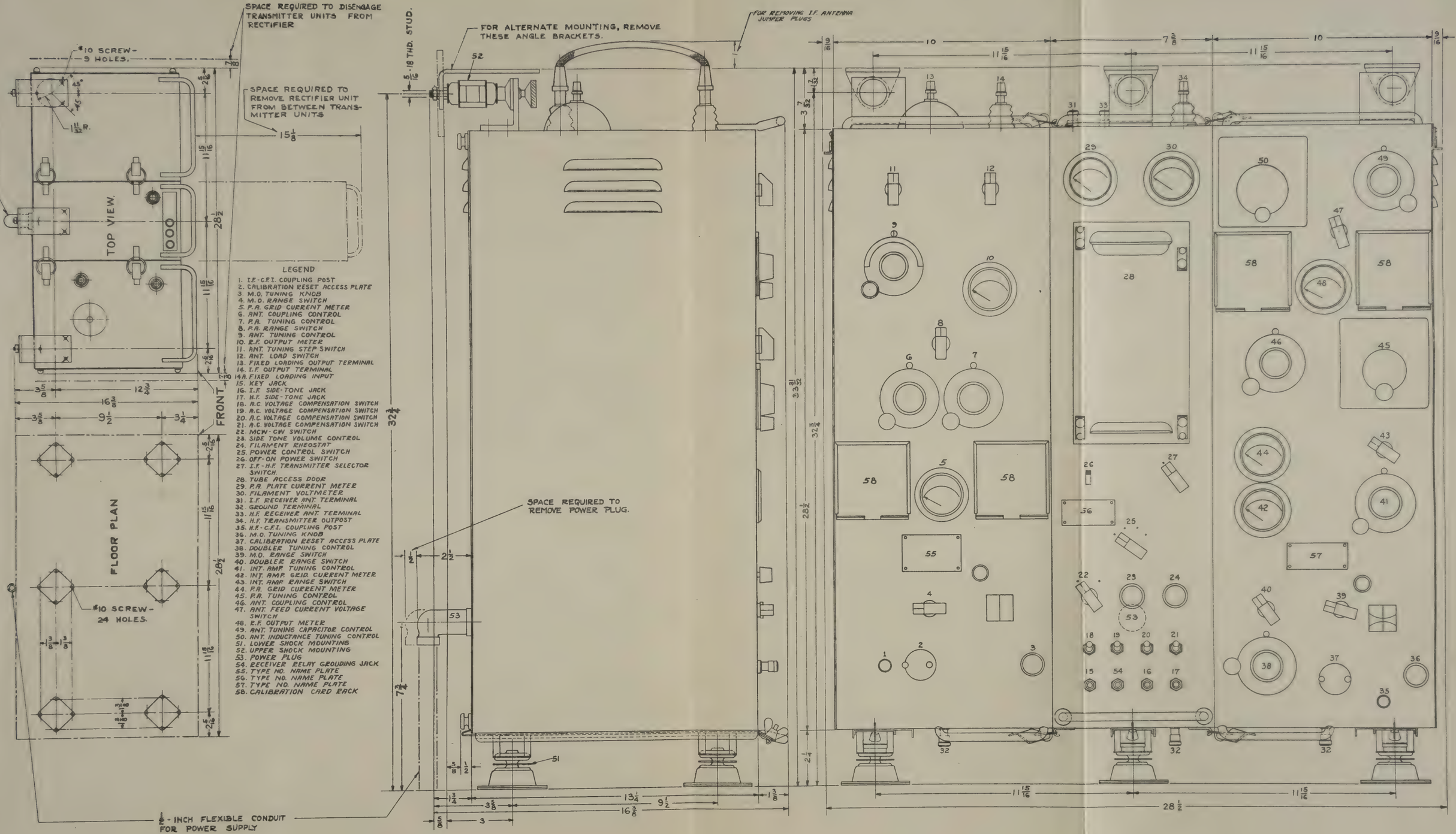


Fig. 21 Transmitter-Rectifier Assembly Model GO-9 Outline and Mounting Dimensions (Dwg. T-7607354).

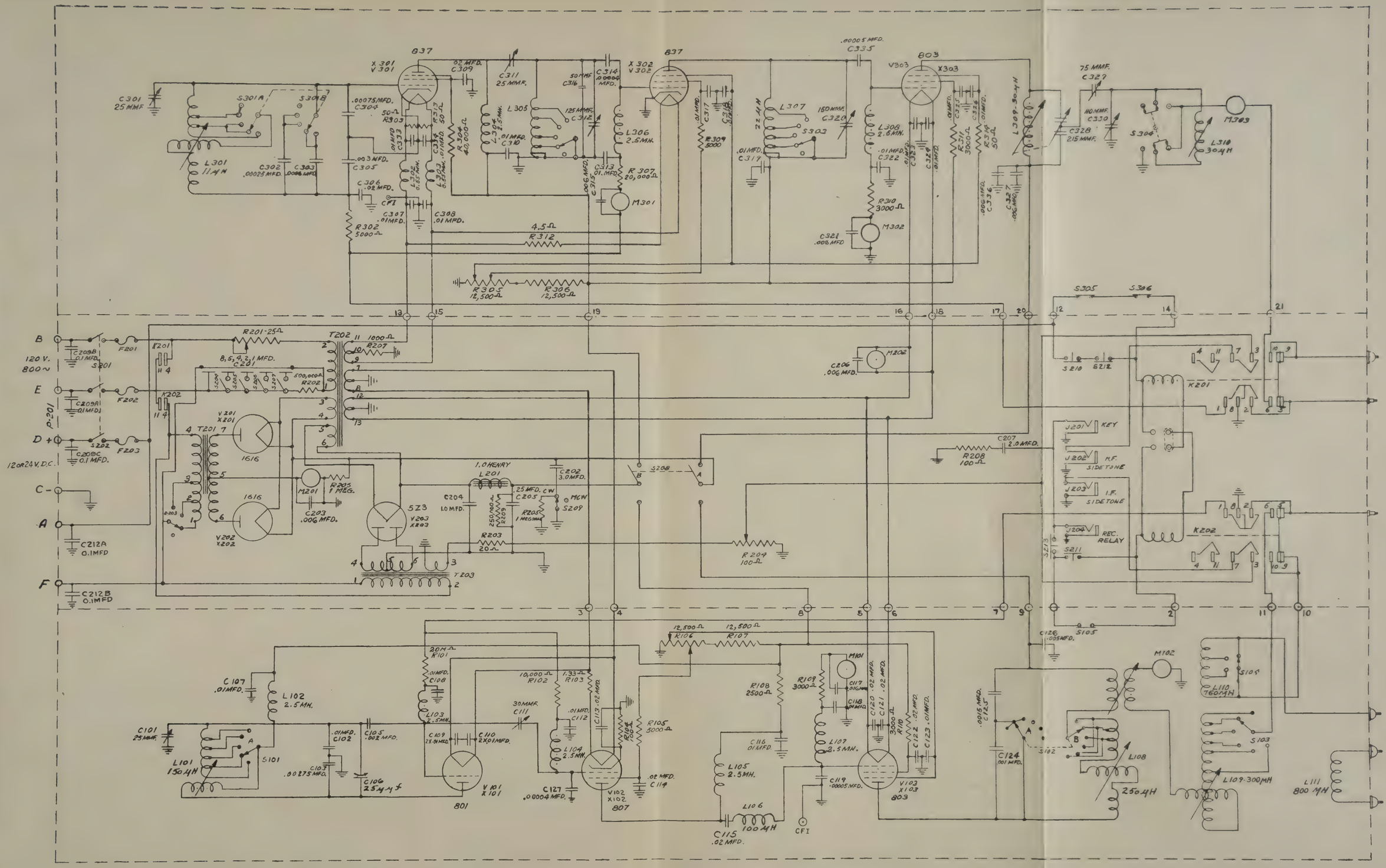
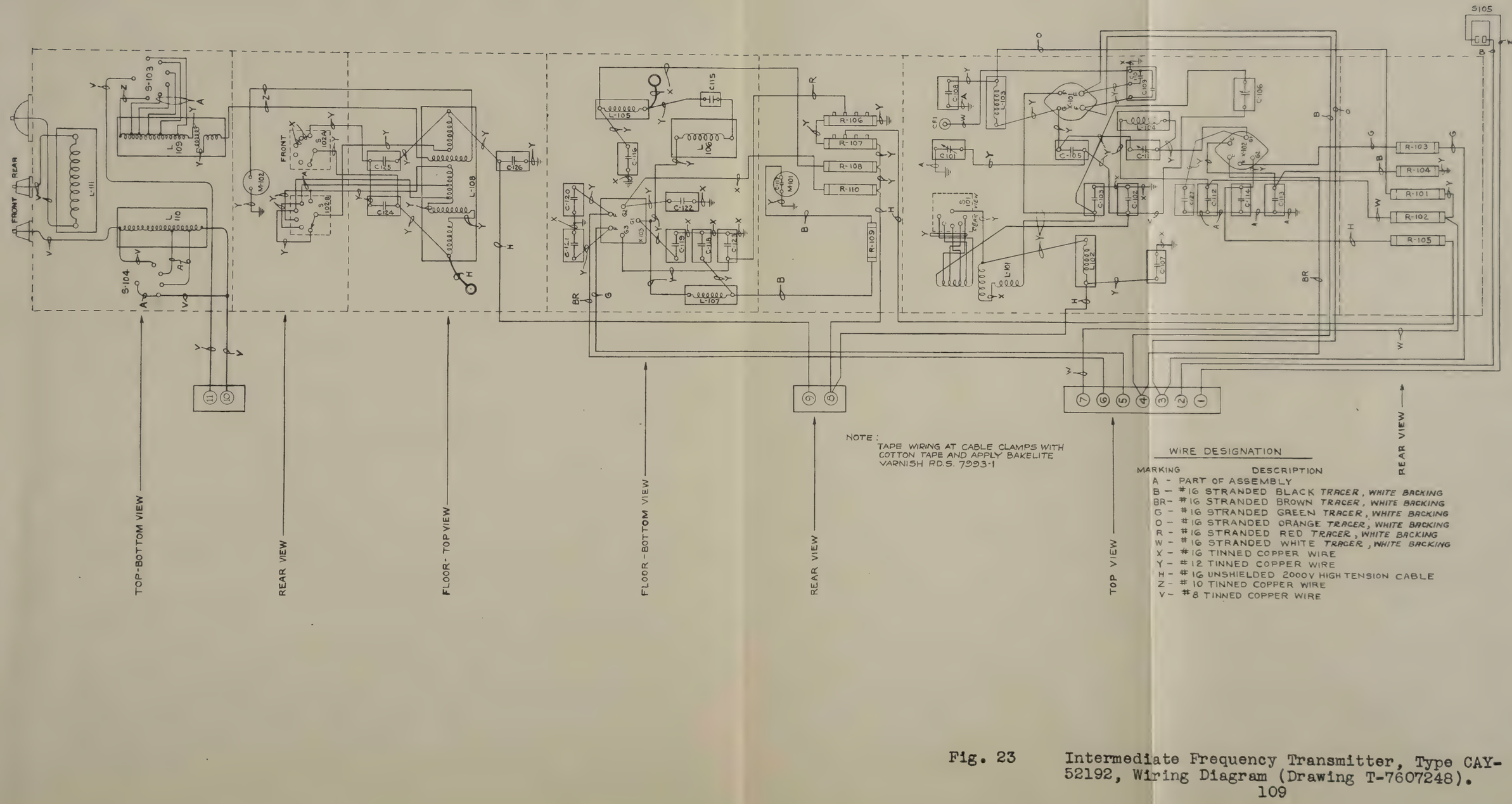


Fig. 22 Transmitting Equipment, Model GO-9, Schematic Diagram (Drawing T-7607246).



NOTE :
TAPE WIRING AT CABLE CLAMPS WITH COTTON TAPE AND APPLY BAKELITE VARNISH RD.S. 7993-1

WIRE DESIGNATION

MARKING	DESCRIPTION
A	- PART OF ASSEMBLY
B	- #16 STRANDED BLACK *TRACER, WHITE BACKING*
BR	- #16 STRANDED BROWN *TRACER, WHITE BACKING*
G	- #16 STRANDED GREEN *TRACER, WHITE BACKING*
O	- #16 STRANDED ORANGE *TRACER, WHITE BACKING*
R	- #16 STRANDED RED *TRACER, WHITE BACKING*
W	- #16 STRANDED WHITE *TRACER, WHITE BACKING*
X	- #16 TINNED COPPER WIRE
Y	- #12 TINNED COPPER WIRE
H	- #16 UNSHIELDED 2000V HIGH TENSION CABLE
Z	- #10 TINNED COPPER WIRE
V	- #8 TINNED COPPER WIRE

Fig. 23 Intermediate Frequency Transmitter, Type CAY-52192, Wiring Diagram (Drawing T-7607248).

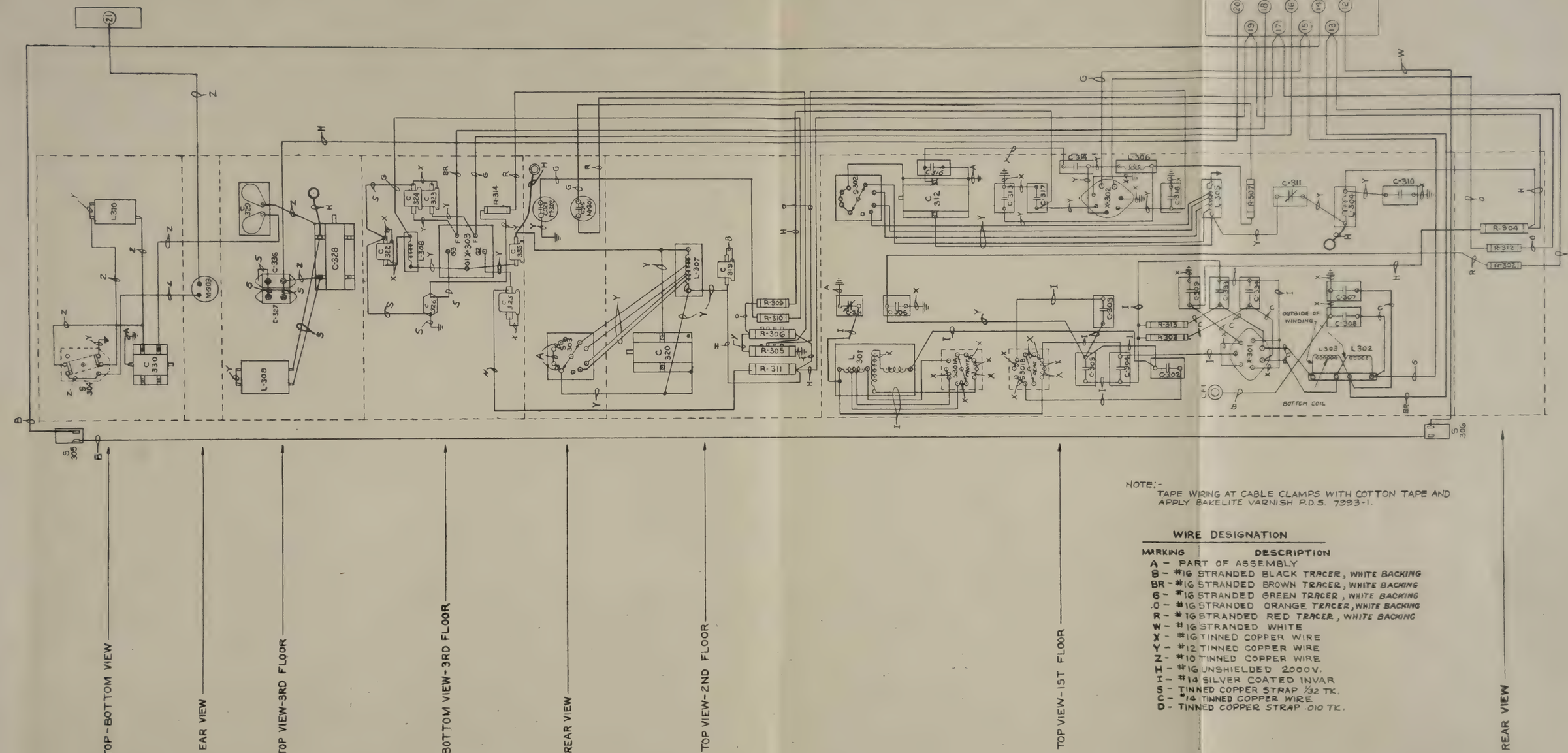
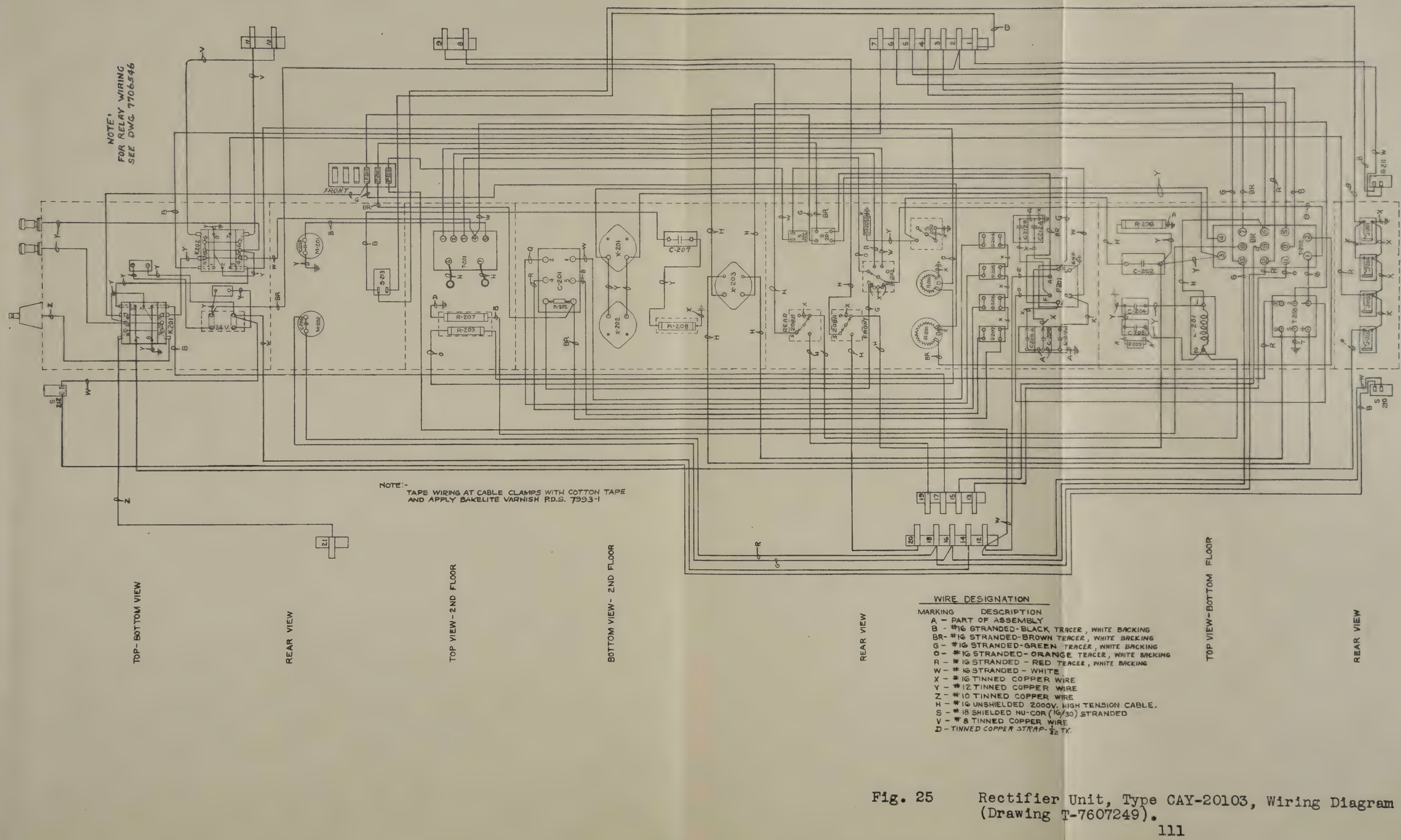


Fig. 24 High Frequency Transmitter, Type CAY-52193, Wiring Diagram (Drawing T-7607247).



WIRE DESIGNATION

MARKING	DESCRIPTION
A	– PART OF ASSEMBLY
B	– #16 STRANDED-BLACK TRACER, WHITE BACKING
BR	– #16 STRANDED-BROWN TRACER, WHITE BACKING
G	– #16 STRANDED-GREEN TRACER, WHITE BACKING
O	– #16 STRANDED-ORANGE TRACER, WHITE BACKING
R	– #16 STRANDED – RED TRACER, WHITE BACKING
W	– #16 STRANDED – WHITE
X	– #16 TINNED COPPER WIRE
Y	– #12 TINNED COPPER WIRE
Z	– #10 TINNED COPPER WIRE
H	– #16 UNSHIELDED 2000V. HIGH TENSION CABLE.
S	– #18 SHIELDED NU-COR (16/30) STRANDED
V	– #8 TINNED COPPER WIRE
D	– TINNED COPPER STRAP – 1/32 TK.

Fig. 25 Rectifier Unit, Type CAY-20103, Wiring Diagram (Drawing T-7607249).

POWER INPUT, RADIO FREQUENCY POWER OUTPUT, TYPICAL METER READINGS AND DIAL SETTINGS, I.F. TRANS. TYPE CAY-52192

Freq. Kcs.	Emission	Antenna Res Ohms	Antenna Cap Mmfd	Input I D.C.	Input E A.C.	Input I A.C.	Watts	Oper. Voltages & Currents (MA) PA Ig	PA Ip	Fil. V	Ant. Current Int. Meter Amps.	Ext. Meter Amps	R.F.Output Act. W	R.F.Output Guar. W	DIAL READINGS A	B	C	D	E	F	G	H	I	J	K
300	CW	40.6	1000	2.45	120	7.4	805	44	175	10	2.2	2.3	214	100	1	352	1	60	3	5	75	20			
	MCW	40.6	1000	2.55	120	6.2	770	45	160	10	2.1	2.2	196	70	1	352	1	60	3	5	75	20			
544	CW	40.6	1000	2.5	120	7.4	820	44	175	10	1.7	1.8	131	100	5	222	5	57	3	5	50	30			
	MCW	40.6	1000	2.45	120	6.4	800	44	175	10	1.5	1.7	117	70	5	222	5	57	3	5	50	30			
600	CW	40.6	1000	2.4	120	7.4	820	42	175	10	1.9	2.0	162	100	5	416	6	37	4	2	57	20			
	MCW	40.6	1000	2.4	120	6.2	790	42	160	10	1.8	1.9	146	70	5	416	6	37	4	2	57	20			
300	CW	4.1	219	2.4	120	7.4	840	46	175	10	4.0	3.9	62	50											
	MCW	4.1	219	2.4	120	6.0	800	47	160	10	3.6	3.4	47	35											
544	CW									10															
	MCW									10															
600	CW									10															
	MCW									10															

(These controls not on I.F. Transmitter Type) CAY-52192

POWER INPUT, RADIO FREQUENCY POWER OUTPUT, TYPICAL METER READINGS AND DIAL SETTINGS, H.F. TRANS. TYPE CAY-52193

3000	CW	40.6	1000	2.4	120	7.5	840	46	175	10	2.2	2.5	253	125	1	375	1	51	1	48	3000	1	35	0	45
	MCW	40.6	1000	2.4	120	6.6	800	48	160	10	2.2	2.4	233	87.5	1	375	1	51	1	48	3000	1	35	0	45
8270	CW	40.6	1000	2.4	120	7.2	790	39	175	10	2.1	2.5	253	125	4	540	5	53	3	75	8270	2	54	0	49
	MCW	40.6	1000	2.4	120	6.5	790	39	165	10	2.0	2.4	233	87.5	4	540	5	53	3	75	8270	2	54	0	49
18100	CW	40.6	1000	2.4	120	7.3	820	20	175	10	1.2	2.2	196	100	1	396	5	74	5	74	18100	2	100	257	49
	MCW	40.6	1000	2.4	120	6.4	780	20	160	10	1.0	2.0	162	70	1	396	5	74	5	74	18100	2	100	257	49
3000	CW	4.1	219	2.4	120	7.6	860	46	175	10	6.5	5.9	142	50											
	MCW	4.1	219	2.4	120	6.6	820	48	165	10	6.2	5.6	128	35											
8270	CW	4.1	219	2.4	120	6.7	810	40	165	10	6.0	6.0	147	50											
	MCW	4.1	219	2.4	120	7.4	850	40	175	10	6.1	6.1	152	35											
18100	CW	4.1	219	2.4	120	7.5	840	20	175	10	2.8	4.6	86	50											
	MCW	4.1	219	2.4	120	6.5	800	21	165	10	2.6	4.4	79	35											

FIG. 32 TYPICAL TEST DATA MODEL GO-9 AIRCRAFT RADIO TRANSMITTING EQUIPMENT

XIII. VACUUM TUBES

ALL TUBES SUPPLIED WITH THE EQUIPMENT SHALL BE CONSUMED PRIOR TO EMPLOYMENT OF TUBES FROM GENERAL STOCK.

CAUTION: - IN ORDER TO OBTAIN SATISFACTORY TUBE LIFE, THE FILAMENT VOLTAGE MUST BE MAINTAINED AT THE CORRECT VALUE OF 10.0 VOLTS AS INDICATED BY THE RED LINE ON THE FILAMENT VOLTMETER. OPERATION AT OVER VOLTAGE WILL REDUCE THE FILAMENT LIFE, WHILE OPERATION AT UNDER VOLTAGE WILL REDUCE THE EMISSION FROM THE TUBE AND IN TIME RESULT IN A DECREASE IN OUTPUT. OTHER RATINGS GIVEN THROUGHOUT THE TEXT OF THIS INSTRUCTION BOOK MUST BE REGARDED IF OPTIMUM TUBE LIFE IS TO BE OBTAINED.

LIST OF TUBES EMPLOYED

13-1. The tubes used in the Model GO-9 Aircraft Radio Transmitting Equipment are as follows:

Intermediate Frequency Transmitter

1 Type 801 Master Oscillator
1 Type 807 Intermediate Amplifier
1 Type 803 Power Amplifier

High Frequency Transmitter

1 Type 837 Master Oscillator
1 Type 837 Intermediate Amplifier or Frequency Doubler
1 Type 803 Power Amplifier

Rectifier Unit

1 Type 5Z3 Low Voltage Rectifier
2 Type 1616 High Voltage Rectifier

13-2. The vacuum tubes used in this equipment are operated within the limits specified in Navy specification RE-13A-600B. If optimum tube life is to be obtained, the cautions given and current limits given throughout this instruction book must be observed.

13-3. When the circuits of the High Frequency Transmitter have been properly resonated, the grid current of the Type 837 tube, used in the intermediate amplifier or frequency doubler circuit, will be approximately 3 to 7 milliamperes as indicated by the I. A. GRID CURRENT meter, while the grid current of the Type 803 tube used in the power amplifier circuit will be approximately 20 to 40 milliamperes as indicated by the P. A. GRID CURRENT meter. The input to the Type 803 power amplifier tube should never exceed

175 milliamperes as indicated by the P. A. PLATE CURRENT meter. Overloading of the power amplifier tube will result in decreased tube life.

13-4. The Intermediate Frequency Transmitter circuits when properly resonated will result in a grid current of approximately 12 to 20 milliamperes for the Type 803 tube used in the power amplifier circuit. This current will be indicated by the P. A. GRID CURRENT meter. The input to the power amplifier tube should never exceed 175 milliamperes as indicated by the P. A. PLATE CURRENT meter.

13-5. Both the Type 801 and Type 803 tubes are of the thoriated filament type. In case of severe overload resulting in the overheating of tubes of this type, the electron emission may be very slight or may be reduced to a point where oscillations will not start. Unless the overload has liberated a large amount of gas the activity of the filament can usually be restored by operating the tube at normal filament potential for ten minutes or longer with the plate potential off. This reactivating process can be accelerated by raising the filament potential to 12 volts, but no higher. The useful life of all thoriated filament tubes is usually ended long before the filament burns out. If a tube loses its emission and cannot be re-activated within a reasonable length of time by the method described above, it should be replaced by a new tube.

13-6. The following tabulation compares the operation of tubes used in the equipment with the ratings listed in Navy specification RE-13A-600B.

Type 801 Tube as a Class C Oscillator

	Full Load Operating Data	Maximum Rating
Plate Voltage	450 Volts	600 Volts
Plate Current	60 MA	70 MA
Control Grid Current (D.C.)	12 MA	15 MA
Filament Voltage	7.5 Volts	7.5 Volts
Filament Current	1.25 Amps.	1.25 Amps.
Plate Dissipation	15 Watts	20 Watts

Type 803 Tube as a Class C Amplifier (C.W. and M.C.W. condition)

	Full Load Operating Data	Maximum Rating
Plate Voltage	1950 Volts	2000 Volts
Plate Current	175 MA	175 MA
Plate Dissipation	125 Watts	125 Watts
Filament Voltage	10.0 Volts	10.0 Volts
Filament Current	5 Amps	5 Amps
Control Grid Voltage (D.C.)	-75 Volts	-500 Volts
Control Grid Current (D.C.)	40 MA	50 MA
Shield Grid Voltage	350 Volts	600 Volts
Shield Grid Watts	25 Watts	30 Watts
Suppressor Grid Voltage	45 Volts	500 Volts

Type 807 Tube as a Class C R.F. Amplifier

Plate Voltage	250 Volts	600 Volts
Plate Current	100 MA	100 MA
Plate Dissipation	25 Watts	25 Watts
Heater Voltage	6.3 Volts	6.3 Volts
Heater Current	0.9 Amps.	0.9 Amps.
Control Grid Voltage (D.C.)	-10 Volts	-200 Volts
Control Grid Current (D.C.)	3 MA	5 MA
Screen Grid Voltage	250 Volts	300 Volts
Screen Grid Current	3.5 MA	11 MA

Type 837 Tube as a Class C Oscillator

	Full Load Operating Data	Maximum Rating
Plate Voltage	500 Volts	500 Volts
Plate Current	.075 Amps.	.080 Amps.
Plate Dissipation	10 Watts	12 Watts
Filament Voltage	12.6 Volts	12.6 Volts
Filament Current	0.8 Amps	0.7 Amps.
Control Grid Voltage (D.C.)	-100 Volts	-200 Volts
Control Grid Current (D.C.)	.008 Amps.	.008 Amps.
Shield Grid Voltage	150 Volts	200 Volts
Suppressor Grid Volts	35 Volts	200 Volts

Type 5Z3 Low Voltage Rectifier

	Full Load Operating Data	Maximum Rating
Filament Voltage	5 Volts	5 Volts
Filament Current	3.0 Amps.	3.0 Amps.
Peak Inverse Voltage	1400 Volts	1400 Volts
Average Plate Current	125 MA	125 MA

Type _1616 Tube as a Half Wave Rectifier

	Full Load Operating Data	Maximum Rating
Filament Voltage	2.5 Volts	2.5 Volts
Filament Current	5.0 Amps.	5.0 Amps
Peak Inverse Voltage	5.0 KV	5.5 KV
Peak Plate Current	0.8 Amp.	0.8 Amp.
*Average D. C. Plate Current	175 MA	260 MA

*From two tubes

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